VOL. 27 No. 3

BULLETIN

OF THE

TORREY BOTANICAL CLUB

MARCH 1900

A new Genus of Hepaticae from the Hawaiian Islands

BY ALEXANDER W. EVANS

(WITH PLATE 1)

Among the tufts of *Herberta sanguinea* collected more than twenty years ago by D. D. Baldwin on the island of Maui, the late C. F. Austin found a few sterile and fragmentary specimens of an hepatic which he recognized as new and doubtfully referred to the genus *Mastigobryum*, as *M. integrifolium*. At my request, Mr. W. H. Pearson kindly sent me, for examination, a portion of Austin's original material. In the packet there is a single stem of the new species, but it is sufficient to show that, although the plant has much in common with *Mastigobryum* or *Bazzania*, as it is now called, it can hardly be retained in this genus, but should rather form the type of a new genus of Hepaticae. The branching of the leafy liverworts was just beginning to receive attention from descriptive hepaticologists at the time Austin wrote, and, as the most essential difference between the new genus and *Bazzania* is a difference in branching, the disposition which he made of his plant was perhaps justified.

An examination of Baldwin's material of *Herberta sanguinea* in the Eaton Herbarium brought to light several additional specimens of this curious species and among them a few showing the floral parts but no perianths. During the past summer, however, Mr. C. M. Cooke, Jr., had the good fortune to find a considerable quantity of the plant on Konahuanui, a mountain about three thousand feet high, on the island of Oahu. As in Baldwin's material, the specimens do not form pure tufts but grow scattered among other hepatics, here, for the most part,

[Issued 24 March 1900.]

species of *Bazzania*, *Pleurozia* and *Anastrophyllum*. Both male and female flowers occur somewhat abundantly and a few of the latter show well developed perianths. Mature capsules, unfortunately, are not present. The descriptions in the present paper are drawn almost entirely from Mr. Cooke's material, which has also served for the drawings.

At a cursory glance, the plant looks unlike a typical *Bazzania*; in the first place because its leaves are transversely inserted and strongly squarrose instead of being incubous and appressed, and in the second place, because its underleaves are relatively larger than those of *Bazzania* and are also strongly squarrose. These peculiarities might seem to indicate an affinity with certain genera of the Ptilidioideae, such as *Mastigophora* or *Herberta* or the curious and imperfectly understood *Herpocladium* of Mitten. The position of the sexual organs, however, both male and female, on short branches axillary to the underleaves, shows at once that the true affinities of the new genus are with the Trigonantheae. The bracts and bracteoles, moreover, as well as the fully developed perianths, are essentially like those of *Bazzania* and of certain other genera of this same tribe.

More important as a generic character than the foliar differences just indicated is a peculiar kind of branching, unlike anything hitherto described for the Hepaticae. In the related *Bazzania*, as is well known from the studies of Leitgeb, the branching is of two kinds. In the first, the so-called "Endverzweigung" or "terminal branching,"* the branches are exogenous in origin and lateral, each branch representing the postical half of one of the lateral segments of the apical cell.† The leaf, which normally develops from the whole of such a segment, is here restricted to the antical half and is therefore narrower than an ordinary leaf and not toothed at the apex. A branch here, which is always an ordinary leafy branch, is of about the same size as the axis from which it springs; and, as the axis is itself deflected in the opposite direction from that taken by the branch, the plants of many species appear

* Untersuch. über die Lebermoose, 2 : 22, 23. *pl. 4. f. 2, 4.* 1875.

† Branching from the postical half of a lateral segment occurs in many genera of the Jungermanniaceæ and (with the modification seen in *Radula*, etc.) is the only type of terminal branching described by Leitgeb.

as if they were repeatedly dichotomous. In the second or "intercalary branching,"* the branches are endogenous in origin and postical, arising in the axils of the underleaves. They develop at some distance from the apex, starting just inside the cortical cells of the axis and forcing these apart as they elongate. Around the base of such a branch, it is possible for a long time to find the remains of these ruptured cells in the form of an indistinct sheath. In *Bazzania*, these intercalary branches are always specialized, sometimes as the very short sexual branches but more commonly as the long and slender root-like flagella with their rudimentary leaves. Both of the kinds of branching just described for *Bazzania* occur in the new genus as well, the ordinary vegetative branches (Fig. 3) and the sexual branches (Fig. 2) arising in precisely the same way in the two genera. In rare cases, nevertheless, the Hawaiian plant will show an ordinary leafy branch springing from the axil of an underleaf and therefore intercalary in nature like the vegetative branches of *Kantia* and of the typical species of *Cephalozia*.

The peculiar branches of the new genus are the flagella. These are similar in appearance to those of *Bazzania*, except that they bear small but distinct leaves near the base; but their place of origin is very different. Instead of developing in the axils of the underleaves, each flagellum arises at one side of an underleaf (Fig. 4); instead of being surrounded by an indistinct sheath, showing that it is endogenous in origin, it is naked at the base and is, therefore, exogenous in origin; the underleaf, finally, beside which a flagellum is situated, is much narrower than an ordinary underleaf. All of these conditions point to the fact that we have to do here with a terminal branching in one of the postical segments of the apical cell. This is made even more evident by a study of the apical region, and in this connection it is instructive to compare what we find in this plant with what is found in the apical region of the closely related *Bazzania*.

The early stages of the leaves and underleaves of *Bazzania trilobata* have been carefully figured and described by Leitgeb.† In this species he finds that the lateral segments cut off from the

* Leitgeb, *l. c.* 2: 30–33. *pl.* 4. *f.* 7–9.

† *L. c.* 2: 10, 11, 13. *pl.* 4.

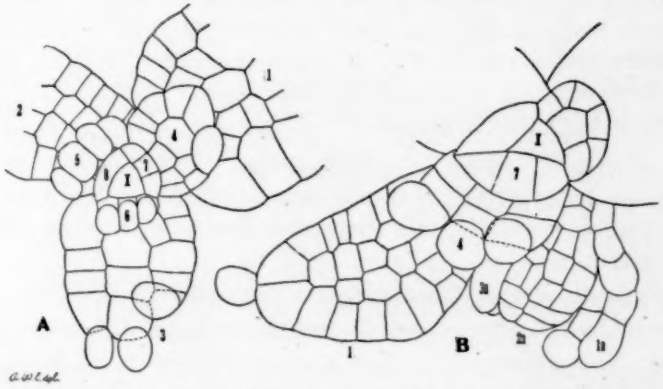
apical cell divide in the usual way into one internal and two external cells. One of these two cells, however, and, apparently, in most cases, the postical one, grows wider than the other and redivides, so that the segment shows three external cells side by side. These three cells correspond with the three teeth at the apex of the mature leaf. In the Hawaiian plant, three external cells are likewise formed in the lateral segments (Fig. A, segment 7), but the mature leaf is subacute and undivided, the three cells, therefore, not giving rise to distinct teeth. This difference is probably not very significant as several species of *Bazzania* with undivided leaves have been described. In each postical segment of *B. trilobata*, one internal and two external cells are formed in the same way as in the lateral segments, but here each of the superficial cells grows wider and divides into two, and the segment shows, therefore, four cells side by side. Each of these cells gives rise to a primordial papilla,* and these four papillae are pushed out by the developing underleaves. The process is, however, irregular, and the lobes of the underleaves often grow out beyond the papillae, leaving them at some little distance from the apex. In each postical segment of the new genus, only three external cells are formed, just as in the lateral segments (Fig. A, segment 6). Each gives rise to a papilla and the three papillae are carried up side by side on the apex of the developing underleaf, which remains broad and undivided (Fig. A, segment 3; Fig. B, segment 4). These three primordial papillae enable us to distinguish at a glance a young underleaf from a young side-leaf, and traces of them may often be detected even in a mature underleaf.

The branching from the lateral segments is the same in both genera and has been briefly described above. It may be remarked, however, that in a branch of this sort, the leaves always maintain a definite sequence; the first leaf is always an underleaf, the second leaf is a side-leaf on the side of the branch turned toward the main axis, and the third leaf is a side-leaf on the side of the branch turned away from the axis. The third leaf, therefore, bears the same relation to the branch that the narrow leaf does to the axis.

In my study of the new genus, I have been unable to find the

* Leitgeb, *l. c.* 2: 15.

very youngest stage of a flagelliform branch. An apical region, however, in which such a branch is found in the third postical segment from the apical cell, shows the following conditions (Fig. B): The underleaf developing from the segment (numbered 1), is narrow and bears a single primordial papilla at the apex; the branch already shows the rudiments of three leaves (numbered 1a, 2a, and 3a), the oldest being a side-leaf on the side away from the underleaf, the second a side-leaf on the side toward the underleaf and the third an underleaf, distinguishable by its three papillae



A. Normal apical region, × 235. *X* Apical cell. 1, 2, 3, etc. Segments in order of age, 3 and 6 showing the young underleaves, each tipped with three primordial papillae.

B. Apical region with young branch in third postical segment from apical cell, × 235. *X*. Apical cell of main axis. 1, 4, 7. Postical segments in order of age; the lateral segments are not numbered as some of the young side-leaves have been dissected away; 1 shows an underleaf with a single primordial papilla, at the side of the young branch. 1*a*, 2*a*, 3*a*. Segments of branch, 3*a* showing the first underleaf, with only two of its three primordial papillae visible.

(only two of which show in the drawing). In this case, therefore, as in the terminal branching from a lateral segment, the third leaf bears the same relation to the flagellum that the underleaf, beside which this specialized branch arises, does to the main axis, and the first two side-leaves are in a corresponding sequence. The same sequence can often be distinguished in an older flagellum (as in Fig. 4, where the second side-leaf is largely concealed), but in some cases the first few leaves are so crowded that it is difficult to make out their true sequence. From the preparation just

described, it is clear, therefore, that the postical segment which is to give rise to a flagellum first divides in the usual way into one internal and two external cells, but that the external cell which normally broadens out and redivides, here develops at once into a branch, leaving only one cell to give rise to the primordial papilla and underleaf. It should be noted also that the flagellum sometimes occurs on the right side of the underleaf and sometimes on the left side, and that both conditions are occasionally found on the same stem.

The peculiar branching just described is of particular interest because it shows that the terminal branching of Leitgeb is not restricted to the postical half of a lateral segment, as that author supposed, but may also occur in either half of a postical segment. The fact that these branches are always specialized as flagella is undoubtedly due largely to their place of origin, and does not affect the point in question. It is, of course, possible that this same type of branching may yet be detected in other genera of the leafy Hepaticae.

The cells of the Hawaiian plant, as is the case with so many alpine and arctic species, are interesting for their extremely thick walls. The thickening is particularly well seen in the cuticle of the leaves. On both surfaces these are densely covered with verruculae which are very distinct on young leaves but become more or less obliterated with age. The trigones of the leaf-cells (Fig. 5) are also conspicuous and project out into the cell-cavities, which are usually distinctly stellate. The trigones are sometimes circular or oval in outline and sometimes tri- or quadri-lobed. Between the trigones the walls are less thickened and sometimes remain very thin, apparently functioning as pits. Along the edges of the leaves (Fig. 6) the cell-walls are irregularly thickened, and it is usually difficult to make out the boundary of the cell-cavity. In the cells of the axis the thickening is also very pronounced (Fig. 7). The superficial cells are here isodiametric, but the internal cells are several times as long as broad. Except for the strongly developed cuticle the thickening is irregular and the cells are provided with pits, which occur in both transverse and longitudinal walls.

The essential characters of Austin's species, both generic and specific, are given in the following description:

Acromastigum gen. nov.

Plants medium-sized, scattered among other hepatics, yellowish-green, becoming brownish with age: stems stiff and wiry, mostly ascending or erect, sparingly branched: vegetative branches of three kinds:—terminal branches from the lateral segments, terminal branches from the postical segments (flagella), intercalary branches axillary to the underleaves (very unusual): rhizoids not abundant: leaves distant or subimbricated, transversely inserted, undivided: underleaves a little smaller than the leaves, undivided: leaf-cells with thickened walls: sexual branches intercalary, arising singly in the axils of the underleaves: ♀ branch very short, its leaves reduced to the three to five rows of bracts; perianth long and slender, hypogonianthous, the three keels distinct except at the cylindrical base, separated by grooves; unfertilized archegonia borne at the base of calyptra; ♂ spike oblong; bracts in several pairs, strongly concave; antheridia occurring singly; paraphyses wanting; bracteoles similar to the underleaves but smaller: sporophyte not seen. (Name from *ακρον*, summit, and *μαστίξ*, a whip or lash, alluding to the flagella and their place of origin.)

Acromastigum integrifolium (Aust.)

Mastigobryum? integrifolium Aust. Bot. Gazette, **1**: 32. 1875

Bazzania? integrifolia Evans, Trans. Conn. Acad. **8**: 225. 1892.

Dioicous: general characters of stems and branches given above: rhizoids whitish, simple or irregularly branched at the ends, very scanty on ordinary vegetative axes and occurring singly or in small clusters at the bases of some of the underleaves, more abundant on the flagella and less definite in position: leaves spreading widely from the stem, usually curved upward in the outer parts, ovate from a broad base, obtuse or more commonly acute, entire or nearly so, rarely with an indistinct angular tooth near apex: underleaves strongly squarrose, ovate or oblong, truncate or rounded at apex, entire or nearly so: leaf-cells with a very thick verruculose cuticle and conspicuous often confluent trigones but no intermediate thickenings: cell-cavities stellate: ♀ bracts very small and similar to ordinary leaves at base of branch but becoming rapidly larger toward perianth: innermost bracts broadly ovate, gradually narrowed from near the base, shortly dentate or laciniate at apex (usually less than one fourth the length) with slender teeth, otherwise entire or nearly so; innermost bracteole similar; perianth linear-fusiform, composed of a single layer of cells except at the very base, cells more uniformly

thickened than the leaf-cells, mouth of perianth contracted, laciniate, the laciniae long and slender, straight or irregularly curved and distorted, sometimes denticulate, composed of a single row of cells above and usually of two or more toward the base: ♂ bracts in about six pairs, strongly concave, ovate, shortly bi- or tri-denticulate at the apex, the teeth one to three cells long, otherwise entire or nearly so; bracteoles similar to ordinary underleaves but smaller.

Stems 3–8 cm. long, 0.25 mm. in diameter; leaves 0.7 × 0.4 mm.; underleaves 0.5 × 0.3 mm.; leaf-cells at edge of leaf 14 μ in diameter, in the middle 18 μ, and at the base 28 × 23 μ; innermost ♀ bracts 1.7 × 1 mm. (on robust specimens with perianths), perianth 4 × 0.85 mm.; ♂ bracts 0.45 × 0.25 mm., bracteoles 0.35 × 0.15 mm., antheridia 0.15 mm. in diameter.

Mixed with other hepatics. West Maui (Baldwin, 1875); Konahuanui, Oahu (Cooke, 1899). Type specimen in Herb. W. H. Pearson.

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Explanation of Plate 1

1. Plant with perianth, natural size.
2. Part of plant with perianth, × 16.
3. Part of sterile plant, showing ordinary vegetative branching, antical view, × 32.
4. Part of sterile stem, showing base of flagellum, postical view, × 32.
5. Cells from middle of leaf, × 255.
6. Cells from apex of leaf, × 255.
7. Cells from stem in longitudinal section, × 255.
8. Innermost ♀ bracts, × 32.
9. Corresponding bracteole, × 32.
10. Laciniae from mouth of perianth, × 32.
11. Transverse section of perianth, × 32.
12, 13. ♂ bracts, × 32.
14. ♂ bracteole, × 32.

A Revision of the Species of Plantago commonly referred to Plantago Patagonica Jacquin

By E. L. Morris

Early in September, 1898, the writer received a labelled specimen of *Plantago* from Arizona. The characters of the specimen and the description in literature of the species, whose name was attached to the specimen, did not agree. Careful verification at the U. S. National Herbarium identified the specimen from Arizona as an undescribed species, but did not identify wholly the specimens of the species quoted. This circumstance suggested further study of the related species and their literature. With few exceptions in all American literature on the Plantaginaceae, the species here considered, when recognized, have been referred to *P. Patagonica* Jacq. or made varieties of the same. This fact led to the study of the original description and plate of Jacquin's *P. Patagonica* (Jacq. Coll. **5**: 1796; and Jacq. Ic. Rar. *pl. 306.* 1781–93). As has been already recognized by many botanists, Jacquin's South American bright green, spreading plant, with its dark green, decurved, then upcurved scapes, and erect spikes, does not occur in North America.

The most recent study of the Plantaginaceae (Alida M. Cunningham, Proc. Ind. Acad. Sci. 1896: 190–207. 1897) was based mostly on observed seed characters, from herbarium material. But these seem to have been accommodated largely to the treatment of the order in Gray's Synoptical Flora; for the writer, in trying to verify the seed characters recorded by Miss Cunningham, has found said characters except color of each of her recorded species all occurring in mature pyxes of numerous herbarium specimens of *P. Purshii* alone, as well as several of them in other individual species.

It is a pleasure to acknowledge the kindness of the Curators of the U. S. National Herbarium, The Gray Herbarium, The Herbarium of the Missouri Botanical Garden, The Columbia University Herbarium, The Herbarium of the Field Columbian

Museum, the Herbarium of the California Academy of Sciences, and Dr. E. L. Greene, in allowing the use of their specimens and libraries.

In the key which follows, the synopsis of the genus is adapted from Gray's Synoptical Flora, except the group indicated by two asterisks (**) which is prepared for the identification of the species treated in this paper.

The species treated are from North America exclusive of Mexico and Central America.

PLANTAGO

§ 1. Flowers all perfect; lobes of the corolla not closed over the pyxis; stamens four.

* Root perennial, biennial, or annual in *P. decipiens*; flowers dichogamous, proterogynous; the style projecting from the apex of the unopened corolla; the anthers long-exserted on capillary filaments after the corolla has expanded; seeds two or more, not hollowed on the face except in *P. lanceolata*.

** Root annual; the petioles dilated at their bases; flowers heterogonous, in the majority of individuals cleistogamous; the lobes of the open corolla wide-spread, nearly equalling the tube; seeds solitary in the two cells, deeply hollowed on the face.

Bracts linear to lanceolate.

Bracts aristate, two or more times as long as the flowers.

Spikes more or less compact; plant dark green.

Spikes large, 20–many flowered. 1. *P. aristata.*

Spike small, 2–20-flowered. 2. *P. aristata Nuttallii.*

Spikes more or less interrupted; plant light green. 3. *P. spinulosa.*

Bracts not aristate, not over two times as long as the flowers.

Bracts linear-subulate to narrowly lanceolate, narrow at the base.

Spikes narrow-cylindrical; whole plant white-woolly, light green. 4. *P. Purshii.*

Spikes narrow-cylindrical, at length interrupted; whole plant silvery-silky, dark green. 5. *P. argyrea.*

Spikes thick, conspicuous on account of the large corollas; plant villous, dark green. 6. *P. Helleri.*

Bracts lanceolate or triangular, wide at the base.

Plant erect; spikes coarse.

Plant glabrous or nearly so, dark green. 7. *P. Wrightiana.*

Plant villous, bright green.

Bracts more than 3 mm. long; sepals scarious, with brown midribs. 8. *P. dura.*

Bracts not more than 3 mm. long; sepals herbaceous, green. 9. *P. inflexa.*

Plant spreading; spikes delicate. 10. *P. lanatifolia.*

Bracts oblong to ovate or orbicular.

Plant villous; bracts as long as the sepals or (*in situ*) equalling the calyx.

Bracts with brown midribs; petals with longitudinal brown streaks.
Plant spreading, stout. 11. *P. insularis.*
Plant erect, slender. 12. *P. brunnea.*
Bracts with green midribs; petals white or tawny, darker at the base only.
Plant short-stemmed; spikes villous; seeds brown. 13. *P. fastigiata.*
Plant acaulescent; spikes pubescent; seeds yellow. 14. *P. scariosa.*
Plant pubescent or glabrate; bracts one half as long as the sepals or shorter.
Leaves linear, 3-ribbed; scapes dilated or stout; spikes several-flowered. 15. *P. erecta.*
Leaves linear-subulate, not ribbed; scapes filiform; spikes 2–4 (–5)-flowered. 16. *P. tetrantha.*

2. Flowers sub-dioecious or cleistogamous; the corolla in the fertile flowers remaining closed or closing over the pyxis, thereby forming a beak; stamens two or four, anthers not exserted; seeds flat or slightly hollowed on the face.

1. PLANTAGO ARISTATA Michx. Fl. Bor. Am. **1**: 95. 1803

P. gnaphalioides var. *aristata* Hook. Fl. **2**: 123. 1838.

P. Patagonica, var. *aristata* Gray, in part, Man. ed. 2. 269. 1856.

A *dark green annual*, with a *thick root*, with a *short erect stem*, varyingly glabrous to villous: *leaves* alternate, *ascending to erect*, several to numerous, *narrowly to broadly linear*, acute or acuminate at the apex, callous-tipped, entire, narrowed to the margined petiole having a semi-clasping base, 80–200 mm. by 1–5 mm., *3–5-nerved, glabrous to villous: peduncles* axillary, erect, *stout*, terete, solitary to numerous, *surpassing the leaves*, 70–200 mm. high, glabrous to pubescent: *spikes in glabrate forms, when young, triangular* by the long lower to the short upper bracts, *in villous forms, when young, top-shaped* by the short appressed lower to the long spreading upper bracts, erect, *short to long cylindrical*, 30–120 mm. by 5 mm. exclusive of the bracts, pubescent: *bracts aristate to foliaceous, ten or less times as long as the flowers, linear-subulate to linear*, acute, 3.5 mm. by 1–2 mm., glabrous to pubescent: flowers perfect, numerous: *calyx* glabrous to villous, its *divisions herbaceous, green, spatulate-oblong*, rounded, 2–5 mm. long: *corolla lobes* spreading, reflexed, the two laterals deflexed, nearly equalling the tube, *round-ovate, obtuse, sub-auriculate at the base*, 2 mm. by 2 mm., *white:* stamens four, barely exserted from the tube: *pyxis one third surpassing the calyx*, broadly oblong, obtuse, 3.5 mm. by 1.5 mm., *circumscissile at the middle:* seeds two, brown, oblong, finely pitted.

A very variable species, of which one hundred and seventy sheets or specimens have been examined from Maine, New Hampshire,

Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, West Virginia, North Carolina, Georgia, Florida, Ohio, Kentucky, Tennessee, Alabama, Mississippi, Illinois, Iowa, Kansas, Missouri, Arkansas, Louisana, Northwest Territory, Yukon Territory, South Dakota, Nebraska, Indian Territory, Oklahoma Territory, Texas, New Mexico, Mexico, as follows: 39 in the U. S. National Herbarium, 37 in the Gray Herbarium, 58 in the Herbarium of the Missouri Botanical Garden, 27 in the Columbia University Herbarium, 7 in the Herbarium of the Field Columbian Museum, 1 in the Herbarium of the California Academy of Sciences, 1 in my own herbarium.

2. **Plantago aristata Nuttallii** (Rapin)

P. Nuttallii Rapin, Mem. Soc. Linn. Par. **6**: 470. 1827 (1828).

P. squarrosa Nutt. Trans. Am. Phil. Soc. n. s. **5**: 178. 1837; not Murr. Comm. Goett. *38. pl. 3.* 1781, from Mem. Soc. Linn. Par. **6**: 488. 1827.

P. filiformis Dcne.; DC. Prod. **13**: 714. 1852.

P. Patagonica, var. *aristata* Gray, in part, Man. ed. 2. 269. 1856.

A *bright or dark green annual*, with a *filiform root*, with a *short erect stem*, pubescent above, *with a row of white hairs at the nodes within each leaf-sheath*: *leaves* alternate, strictly *erect*, several, *filiform-linear to filiform*, callous-tipped, sometimes involute, *sessile* and sheathing at the base, 30–150 mm. long, glabrous: *peduncle terminal*, erect, *slender, solitary, two or more times as long as the leaves*, 60–280 mm. high, pubescent: *spike small, 2–20-flowered*, erect, *capitate to oblong*, 4–25 mm. by 3–6 mm., pilous: *bracts* rigid, *herbaceous, with small scarious margins at the base only, two to three times as long as the flowers, linear-aristate, carinate at the base*, acute, 5–15 mm. long, glabrous or with a few hairs: flowers perfect: *calyx* pilous, its *divisions with narrow or wide scarious margins*, dark green or brown, oblong, obtuse, 2–5 mm. long: *corolla* equalling the calyx, its *lobes* spreading, *equal to the constricted neck, ovate to round-ovate*, obtuse, *subauriculate at the base*, 2 mm. by 1.5 mm., *white:* stamens four, long or short-exserted: *pyxis two times as long as the calyx*, oblong, obtuse, 3.5 mm. by 2 mm., *circumscissile at the middle:* seeds two, dark brown, oblong, rough.

This sub-species occurs only in parts of the range of *P. aristata*, frequently with it. Thirty-three sheets or specimens have been examined from Rhode Island, Connecticut, North Carolina, Illinois, Iowa, Missouri, Indian Territory, Oklahoma Territory, Texas, New Mexico, as follows: 7 in the U. S. National Herbarium, 8 in the Gray Herbarium, 15 in the Herbarium of the Missouri Botanical Garden, 2 in the Columbia University Herbarium, 1 in the Herbarium of the California Academy of Sciences.

3. PLANTAGO SPINULOSA Dcne.; DC. Prod. **13**: 713. 1852

P. Patagonica, var. *spinulosa* Gray, Man. ed. 2. 269. 1856.

This species is an aggregate. The following description and the annotations therefrom are to be considered temporary.

A *light or bright green annual*, with a *short, simple or branched stem, varyingly glabrate to villous: leaves* alternate, *ascending to erect*, few to numerous, *linear to linear-lanceolate*, acuminate and involute at the apex, callous-tipped, entire, narrowed to the margined sheathing *petiole in which three ribs remain free*, 80–125 mm. by 2–7 mm., *3–5-ribbed*, with fainter interposed nerves, *glabrate to villous: peduncles* axillary, ascending to erect, solitary to several, *surpassing the leaves or shorter*, 50–200 mm. high, pubescent: *spikes gradually interrupted after anthesis* till the internodes become 5 or more mm. long, ascending to erect, *long-cylindrical*, 50–100 or more mm. long, pubescent: *bracts rather rigid-herbaceous, two or more times as long as the flowers, linear-subulate to aristate*, acute, 7–12 or more mm. by 0.5 mm., glabrate to villous: *flowers* perfect, when old *verticillate in threes: calyx* pubescent, its *divisions scarious, with light-green midribs, or the outer ones nearly herbaceous*, spatulate-oblong, rounded, 2 mm. long: *corolla* one third surpassing the calyx, its *lobes* strongly reflexed, the two laterals deflexed, *two or more times as long as the constricted throat, ovate, obtuse, subauriculate at the base*, 1.5 mm. by 1 mm., *white:* stamens four, and, with the style, just exserted from the tube, or a little longer: *pyxis equalling or surpassing the calyx*, oval, rounded, 2 mm. by 1 mm. or larger, *circumscissile at the middle:* seeds two, dark brown, oblong, finely pitted.

Forty-one sheets or specimens have been examined from South Dakota, Nebraska, Oklahoma Territory, Texas, Montana, Wyoming, Colorado, New Mexico, Idaho, Utah, Arizona, Oregon, California, Lower California, as follows: 15 in the U. S. National Herbarium, 6 in the Gray Herbarium, 10 in the Herbarium of the Missouri

Botanical Garden, 8 in the Columbia University Herbarium, 2 in the Herbarium of the California Academy of Sciences.

4. PLANTAGO PURSHII R. & S. Syst. **3**: 120. 20 Mh. 1818.

P. Lagopus Pursh, Fl. **1**: 99. 1814; not L. Sp. Pl. 114. 1753.

P. gnaphaloides Nutt. Gen. I.: 100. 27 My. 1818.

P. Hookeriana F. & M. Ind. Sem. Petrop. 39. 1838.

P. Patagonica, var. *gnaphalioides* Gray, Man. ed. **2**. 269. 1856.

This species is an aggregate. The following description and the annotations therefrom are to be considered temporary.

A very polymorphous species; a *light green annual*, with *acaulescent* base *or* a *very short*, simple or branched *stem*, generally *snow-white to tawny villous to thick-woolly: leaves* basal or alternate, *erect*, lax or rigid, several to numerous, *linear*, sometimes wider above the middle, *long-tapering to an acute apex*, callous-tipped, entire or with a few callous teeth, narrowed to the margined petiole having a semi-clasping base, 50–200 mm. by 2–18 mm., *3-ribbed* or with very faint ones interposed, rarely glabrate to *villous to very woolly: scapes* basal or axillary, erect, *stout*, numerous, *surpassed by or surpassing the leaves*, 50–400 mm. high, *villous or woolly: spikes hoary*, erect, *long-cylindrical*, 30–130 mm. by 5–7 mm., densely villous: *bracts* rigid, *herbaceous, slightly scarious-sided at the base, equalling to twice as long as the flowers, linear-subulate*, acute, 5–10 mm. long, villous: *calyx* villous, its *divisions herbaceous and scarious-sided, green*, oblong, rounded, 3 mm. long: *corolla* surpassing the calyx, its *lobes* reflexed-spreading, three or more times as long as the constricted throat, *broadly ovate, obtuse, sub-auriculate at the base*, 2 mm. by 2 mm., *white:* stamens four, just exserted from the tube or with long capillary filaments: *pyxis one third surpassing the calyx*, oval, rounded, 4 mm. by 2 mm., *circumscissile at the middle:* seeds two, light brown, oblong, finely pitted.

Two hundred and eleven sheets or specimens have been examined from Minnesota, Iowa, Missouri, Arkansas, North Dakota, South Dakota, Nebraska, Kansas, Indian Territory, Oklahoma Territory, Montana, Wyoming, Colorado, New Mexico, Texas, Northwest Territory, Assiniboia, Idaho, Utah, Arizona, British Columbia, Washington, Oregon, California, as follows: 74 in the U. S. National Herbarium, 30 in the Gray Herbarium, 52 in

the Herbarium of the Missouri Botanical Garden, .39 in the Columbia University Herbarium, 2 in the Herbarium of the Field Columbian Museum, 12 in the Herbarium of the California Academy of Sciences, 2 in my own herbarium.

5. **Plantago argyrea** sp. nov.

A *dark green acaulescent annual*, generally *silvery-silky, in age becoming white silky-villous: leaves* basal, erect, numerous, *linear or slightly wider above the middle*, acute or tapering at the apex, callous-tipped, entire, narrowed to the petiole having a slightly expanded base, 50–100 mm. by 2–4 mm., *3-ribbed, silvery-silky when young to silky-villous when old: scapes* basal, erect, one to several, *surpassing the leaves*, 100–180 mm. high, *finely silver-pubescent: spikes* erect, *short to long-cylindrical, at length interrupted*, 15–60 mm. by 7 mm., *long-villous: bracts* rigid, *herbaceous and scarious-margined on one side or unequally on both sides, equalling the calyx or shorter, narrowly lanceolate*, acute, about 3 mm. long, *dark green or brown, villous: calyx* villous, its *divisions brown-herbaceous and widely scarious-sided*, oblong, rounded, 3 mm. long: *corolla* surpassing the calyx, its *lobes* reflexed-spreading, *two or more times as long as the constricted throat, ovate, acute or nearly obtuse, slightly sub-auriculate at the base*, 2 mm. by 2.5 mm., *white to tawny:* stamens four, just exserted from the tube or on long filaments: *pyxis one third surpassing the calyx*, oval, rounded, 3.5 mm. by 2 mm., *circumscissile just below the middle:* seeds two, dark brown, oblong, finely pitted.

Five sheets or specimens have been examined from Arizona, as follows: 2 in the U. S. National Herbarium, 2 in the Herbarium of the California Academy of Sciences, 1 in my own herbarium. Type specimen is J. W. Toumey's no. 355c, from Castle Creek, Arizona, June 21, 1892, in the U. S. National Herbarium.

6. PLANTAGO HELLERI Small, Bull. N. Y. Bot. Gard. **1**: 288. 1899

A low *deep green annual*, with a *short, erect stem*, generally villous: *leaves* alternate, *ascending to erect*, several to numerous, *linear to linear-spatulate*, tapering to the acute apex, callous-tipped, entire, narrowed to the margined petiole having a semi-clasping base, 50–160 mm. by 2–5 mm., *3–5-ribbed or the ribs obsolete, loosely to sparingly villous to glabrate in age: peduncles* axillary, erect, *rather stout*, terete, solitary to several (then crowded), *when crowded surpassed by the leaves, when few equalling or surpassing them,*

20–50 mm. high, villous: *spikes thick, conspicuous on account of the relatively large corollas*, erect, *ovate to short-cylindrical*, 10–30 mm. by 5–10 mm., villous at the base to pilous at the apex: *bracts* rigid, *herbaceous and scarious-sided*, the lowest surpassing (by one half-length) the flowers to the uppermost equalling the calyx, *linear-subulate*, acute, 5–8 mm. long, villous: flowers perfect, numerous: *calyx* pubescent to villous, its *divisions herbaceous and scarious-sided, dark-green or brown*, spatulate-oblong, obtuse, 4 mm. long: *corolla* with the tube less than one third surpassing the calyx, its *lobes* strongly reflexed in fruit, *twice the length of the constricted throat, broadly ovate, obtuse*, 3–5 mm. by 3 mm., *white, with a deep brown throat:* stamens four, just exserted from the throat: *pyxis one third surpassing the calyx*, oblong, truncate at the apex, 4 mm. by 3 mm., *circumscissile at the lower third:* seeds two, brown, narrowly oblong, slightly constricted below the middle, finely pitted.

Eleven sheets or specimens have been examined from Texas and New Mexico, as follows: 5 in the U. S. National Herbarium, 5 in the Gray Herbarium, 6 in the Herbarium of the Missouri Botanical Garden, 1 in the Herbarium of the California Academy of Sciences.

7. PLANTAGO WRIGHTIANA Dcne.; DC. Prod. **13**: 712. 1852

P. Patagonica, var. *nuda* Gray, Man. ed. 2. 269. 1856.

A relatively tall *dark green annual*, with an *erect stem, glabrous except the spikes and the upper part of the peduncles: leaves* alternate, erect, numerous, *linear, truncate and callous at the apex*, entire, occasionally involute near the apex, tapered to the narrow petiole having a semi-clasping base, 60–160 mm. by 3–4 mm., sometimes narrower, *3–5-nerved, glabrous or with a few hairs only: peduncles* axillary, *slender at the base and gradually dilated to the stout summit*, solitary to several, *surpassing the leaves*, 100–300 mm. high, appressed pubescent: *spikes* many-flowered, *conspicuous on account of the large corollas*, erect, *long-cylindrical*, 25–65 mm. by 6–8 mm., villous: *bracts* rigid, *herbaceous and with scarious margins, equalling or shorter than the sepals, triangular-lanceolate to ovate*, obtuse, 3 mm. by 1 mm., villous or less hairy: flowers perfect: *calyx thick* and rigid, pilous, its *divisions herbaceous, dark green or brownish*, narrowly obovate, rounded, 3 mm. long: *corolla lobes* spreading and reflexed, the two laterals deflexed, *triangular-ovate, obtuse*, 3 mm. by 2.5 mm., *white:* stamens four, long-exserted: *pyxis one third surpassing the calyx*, ovate, rounded, 4 mm.

by 2 mm., *circumscissile below the middle:* seeds two, brown, slightly constricted below the middle, finely pitted.

Twenty-one sheets or specimens have been examined from Texas and Arizona, as follows: 6 in the U. S. National Herbarium, 6 in the Gray Herbarium, 8 in the Herbarium of the Missouri Botanical Garden, 1 in the Herbarium of the California Academy of Sciences.

8. **Plantago dura** sp. nov.

A *green sub-caulescent annual*, with a *hard woody root*, generally *short-villous*, glabrous when very old: *leaves* crowded, erect, numerous, *linear*, tapering to the acute apex, callous-tipped, entire, narrowed a little to the slightly margined petiole having a semi-clasping base, about 150 mm. by 5 mm., *3-nerved, the outer very near the margin*, villous to glabrate: *scapes* erect, *stout*, terete, several to numerous, *equalling and surpassing the leaves*, 100–250 mm. high, pubescent to villous: *spikes* many-flowered, *conspicuous, coarse, thick*, erect, *cylindrical*, 30 mm. by 8 mm., villous: *bracts* rigid, herbaceous, *scarious-sided on the lower third*, two or less times as long as the calyx, *narrowly lanceolate, widest at the base, at least the lowest distinctly callous-tipped*, 6 mm. or less by 2 mm., *white villous:* flowers perfect: *calyx* villous on the midribs, its *divisions scarious, with brown rigid midribs*, narrowly obovate, obtuse, 3 mm. long: *corolla lobes* spreading and reflexed, *orbicular-ovate, obtuse*, 2 mm. by 2 mm., *white:* stamens four, about equalling the petals: *pyxis one third surpassing the calyx*, narrowly ovate, obtuse, 3 mm. by 2 mm., *circumscissile below the middle:* seeds two, dark brown, narrowly ovate, finely pitted.

Three specimens have been examined from Santa Catalina Island, Calif., as follows: 1 in the U. S. National Herbarium, 1 in the Gray Herbarium, 1 in the Herbarium of the Missouri Botanical Garden. Type specimen is from Blanche Trask's collection from Avalon, Santa Catalina Island, Calif., June, 1897, in the U. S. National Herbarium.

9. **Plantago inflexa** sp. nov.

A relatively tall, *bright green annual*, with a *short erect stem, generally villous: leaves* alternate, ascending to erect, several to numerous, *oblanceolate-linear*, acute at the apex, callous-tipped, often so involute near the apex as to appear acuminate, entire or with scattered callous teeth on the upper half, narrowed to the margined petiole having a semi-clasping base, 100–200 mm. by

5–10 mm., *5–7-nerved, the nerves continuing throughout the petiole*, villous: *peduncles* axillary, ascending to erect, *very stout*, terete, solitary to several, *surpassing the leaves*, 120–400 mm. high, appressed pubescent to villous: *spikes coarse*, many-flowered, erect, *long-cylindrical*, 35–100 mm. by 5–6 mm., *villous: bracts* rigid, *with scarious margins, from one half to two times as long as the sepals, triangular-subulate*, acute, 2.5–3 mm. by 0.75–1 mm., pubescent: flowers perfect: *calyx* villous, its *divisions herbaceous, green*, spatulate-oblong, rounded or retuse, 3 mm. long: *corolla lobes* spreading and reflexed, the two laterals deflexed, *broadly ovate, obtuse, sub-auriculate at the base*, 2.25 mm. by 2 mm., *white*, the neck of the tube short or none: stamens four, barely exserted from the tube: *pyxis one third surpassing the calyx*, slightly truncate at the apex, 4 mm. by 2.5 mm., *circumscissile at the middle:* seeds two, dark brown, oblong, finely pitted.

Twenty-one sheets have been examined from Texas, as follows: 3 in the U. S. National Herbarium, 8 in the Gray Herbarium, 7 in the Herbarium of the Missouri Botanical Garden, 1 in the Columbia University Herbarium, 2 in the Herbarium of the California Academy of Sciences. Type specimen is F. Lindheimer's "no. 163, Flora Texana exsiccata" from Cat Spring, Texas, April, 1844, of which there are two sheets in the Herbarium of the Missouri Botanical Garden.

10. **Plantago lanatifolia** (Coult. & Fish.) Small MS.

P. Patagonica, var. *lanatifolia* Coult. & Fish. Bot. Gaz. **18**: 303. 1883.

A *low spreading acaulescent annual*, generally villous and at *the base usually lanate: leaves basal, spreading*, several to numerous, *oblanceolate to spatulate-linear, abruptly short-acuminate*, sparingly denticulate, narrowed to the margined petiole having a semi-clasping base, 50–80 mm. by 4–6 mm., *5–7-nerved, villous to white woolly-lanate: scapes* basal, *spreading to ascending*, terete, several, *equalling and surpassing the leaves*, 30–50 mm. high, short-villous: *spikes* several-flowered, ascending to erect, *short-cylindrical*, 10–20 mm. by 6–10 mm.: *bracts* rigid, *herbaceous, scarious-sided at the base, two thirds to three quarters as long as the sepals, lanceolate-deltoid to linear-subulate*, acute, 2 mm. by 1 mm., slightly pubescent: flowers perfect: *calyx* pilous, its *divisions with narrow scarious margins, green and white*, narrowly oblong, obtuse or rounded, 2–5 mm. long: *corolla lobes* spreading and reflexed, *triangular-ovate, obtuse*, 2 mm. by 2 mm., *white, with small dark spots at the*

base: stamens four, shorter than the petals or only just exserted from the tube: *pyxis circumscissile at the lower third.*

Nine sheets and specimens have been examined from Texas and New Mexico, as follows: 4 in the U. S. National Herbarium, 1 in the Gray Herbarium, 1 in the Herbarium of the Missouri Botanical Garden, 3 in the Columbia University Herbarium.

11. PLANTAGO INSULARIS Eastwood, Calif. Acad. Sci. III. 1: 112. 1898

A *low spreading green annual,* with a slender root, *with a short, simple or branched stem, generally lanate: leaves* alternate, *spreading or erect,* several to numerous, *linear-lanceolate,* acute at the apex or acuminate by the involute margins, callous-tipped, entire or callous-toothed, narrowed to the naked petiole having a semi-clasping base, 40–100 mm. by 4–12 mm., *3-ribbed, lanate: peduncles* axillary, *wide-spreading to ascending,* terete (occasionally stout), several to numerous, *surpassing the leaves,* 40–160 mm. long, canescent to pilous: *spikes thick,* many-flowered, *conspicuous by the dark longitudinal streaks in the petals,* erect, *oblong or in small forms capitate,* 7–20 mm. by 5–10 mm., villous: *bracts scarious, with brown midribs, equalling the calyx or slightly shorter, broadly ovate, rounded or retuse,* 3 mm. by 3 mm., pubescent or sometimes villous on the midribs: flowers perfect: *calyx* pubescent or villous on the midribs, its *divisions scarious, with brown midribs,* broadly oblong, obtuse, 3 mm. long: *corolla* with the tube equalling or somewhat surpassing the calyx, its *lobes* reflexed-spreading, three times as long as the constricted throat, *ovate, abruptly short-acuminate or acute,* 2 mm. by 1.25 mm., *brown* (at the base or) *in longitudinal streaks:* stamens shorter than or just equalling the petals; styles nearly equalling them: *pyxis two times as long as the calyx,* ovate, obtuse or truncate, 3 mm. by 2 mm., *circumscissile at the lower third, purple:* seeds two, brown, narrowly oblong, finely striate longitudinally, glossy.

Seventeen sheets or specimens have been examined from southern California and Lower California, as follows: 5 in the U. S. National Herbarium, 3 in the Herbarium of the Missouri Botanical Garden, 2 in the Columbia University Herbarium, 4 in the Herbarium of the California Academy of Sciences, 3 in Dr. E. L. Greene's Herbarium.

12. **Plantago brunnea** sp. nov.

A *low green slender-rooted annual,* generally villous: *leaves* basal, erect, several to numerous, *narrowly linear,* acute at the

apex, callous-tipped, entire or with several brown callous teeth, narrowed to the margined petiole having a semi-clasping base, 50–120 mm. by 1.5–4 mm., *3-ribbed, villous: scapes* erect or ascending, *slender*, sometimes flattened, *two to numerous, surpassing the leaves*, 75–220 mm. high, sparingly pubescent to *tomentous below the spikes: spikes small*, many-flowered, *somewhat conspicuous on account of the dark longitudinal streaks in the petals*, erect, *capitate*, 6–10 mm. (occasionally longer) by 6 mm., pubescent to villous: *bracts* rigid, scarious, *with brown* (or rarely green) *midribs, as long as the sepals, ovate or broader*, obtuse (occasionally retuse), 2 mm. by 2 mm., pubescent on the midribs: flowers perfect: *calyx* pubescent, its *divisions scarious, with brown and green midribs*, broadly oblong, obtuse, 2 mm. long: *corolla* with the tube little surpassing the calyx, its *lobes* reflexed-spreading, *two times as long as the constricted throat, ovate, acute or obtuse*, 2 mm. by 1.5 mm., *white, with brown longitudinal streaks*, in some flowers white throughout: stamens four, equalling the corolla lobes; style nearly equalling them: *pyxis two times as long as the calyx*, ovate, rounded at the apex, 3.5 mm. by 2 mm., *circumscissile just below the middle:* seeds two, light brown, narrowly oblong, smooth and glossy.

Fourteen sheets or specimens have been examined from California and Lower California, as follows: 4 in the U. S. National Herbarium, 1 in the Gray Herbarium, 3 in the Herbarium of the Missouri Botanical Garden, 2 in the Columbia University Herbarium, 4 in the Herbarium of the California Academy of Sciences. Type specimen is Dr. Edward Palmer's no. 654, from San Quentin Bay, Lower California, January, 1889, in the U. S. National Herbarium.

13. **Plantago fastigiata** sp. nov.

A *low green annual*, with a short *erect stem or with short ascending branches*, generally densely villous and tomentous: *leaves* alternate, crowded on the branches, erect or ascending, numerous, *narrowly to lanceolate-linear*, tapering to the acute callous-tipped apex, entire or with scattered minute callous teeth, narrowed to the semi-clasping petiole, 40–120 mm. by 3–5 mm., *3-ribbed, densely white-villous: peduncles* axillary, erect or ascending, erete, several to numerous, *surpassing the leaves*, 70–170 mm. high, pilous to *tomentous below the spikes: spikes* many-flowered, erect, *short cylindrical*, 10–20 mm. by 5–7 mm., *villous to heavily tomentous* in smaller plants: *bracts* rigid, *with tawny to green midribs, equalling the calyx, oblong to ovate*, obtuse, 2.5 mm. by 2 mm., glabrate to pilous: flowers perfect: *calyx* villous or pubescent, its

divisions scarious, with green midribs, broadly oblong, obtuse, 2.5 mm. long: *corolla* with the tube equalling the calyx, its *lobes* reflexed-spreading, *four times as long as the constricted throat, round-ovate, abruptly acute*, 2 mm. by 1.5 mm., *white to tawny, darker at the base:* stamens and style equalling the corolla lobes: *pyxis two times as long as the calyx*, oval, rounded at the apex, 4 mm. by 2 mm., *circumscissile just below the middle:* seeds two, brown, narrowly oblong, very finely pitted.

Eighteen sheets or specimens have been examined from Arizona and southern California, as follows: 8 in the U. S. National Herbarium, 1 in the Gray Herbarium, 4 in the Herbarium of the Missouri Botanical Garden, 1 in the Columbia University Herbarium, 3 in the Herbarium of the California Academy of Sciences, 1 in Dr. E. L. Greene's Herbarium. Type specimen is J. W. Toumey's no. 355a, from Tucson, Arizona, April, 1892, of which there are two sheets in the U. S. National Herbarium.

14. **Plantago scariosa** nom. nov.

P. minima Alida M. Cunningham, Proc. Ind. Acad. Sci. 1896: 202. 1897; not *P. minima* DC. Fl. Fr. **3**: 408. 1805; nor *P. minima* Less.; Barn. Monog. Plantag. 41. 1845.

A *low light green acaulescent annual, generally thick-villous: leaves* basal, erect, several to numerous, *linear to occasionally lanceolate-linear*, acute at the apex, callous-tipped, entire or with a few scattered callous teeth, narrowed to the semi-clasping petiole, 20–40 mm. by 2–4 mm., occasionally longer and equalling the scapes, *obscurely 3-ribbed, white-tomentous* to glabrate in age: *scapes* erect, *slender*, terete, two to several, *surpassing the leaves*, 30–120 mm. high, villous to *tomentous below the spikes: spikes* 6–20-flowered, erect, *capitate to oblong*, 5–18 mm. by 5–6 mm., *densely villous: bracts* rigid, *scarious, with green or purplish midribs, as long as the sepals, narrowly to broadly ovate*, obtuse, 3 mm. by 3 mm., glabrous or pubescent on the midribs: flowers perfect: *calyx* glabrate or pubescent, its *divisions scarious, with green or purplish midribs, obovate*, obtuse, 2.5 mm. long: *corolla* with the tube equalling the calyx, its *lobes* reflexed-spreading, *two and one half times as long as the constricted throat, round-ovate, acute or abruptly short-acuminate*, 2 mm. by 1.5 mm., *white, with a dark base:* stamens four, equalling the petals; style nearly equalling them: *pyxis two times as long as the sepals*, ovate, rounded at the apex, 4 mm. by 3 mm., *circumscissile just below the middle:* seeds two, yellow, narrowly oblong, smooth and glossy.

Twenty sheets or specimens have been examined from Utah, Nevada, Arizona, California, as follows: 7 in the U. S. National Herbarium, 2 in the Gray Herbarium, 2 in the Herbarium of the Missouri Botanical Garden, 4 in the Columbia University Herbarium, 3 in the Herbarium of the California Academy of Sciences, 1 in Dr. E. L. Greene's Herbarium.

15. **Plantago erecta** nom. nov.

P. Patagonica, var. *Californica* Greene, Man. Bay Reg. 236. 1894; not *P. Californica* Greene, Bull. Calif. Acad. Sci. **1**: 123. 1885.

This species is an aggregate. The following description and the annotations therefrom are to be considered temporary.

A *low bright or dark green acaulescent annual*, generally pubescent or sparingly villous: *leaves* basal, strict and erect or rarely spreading, rather slender, several to numerous, *narrowly linear, obtuse at the apex, almost truncately and brown callous-tipped*, entire, usually involute towards the apex, narrowed to the *long slightly clasping petiole*, 40–100 mm. by 1–2.5 mm., *3-ribbed*, the outer very near the margins and frequently forming a part of the involution, pubescent with spreading hairs: *scapes strictly erect* or rarely spreading, slender at the base, *gradually dilated* and tending to become stout at the base of the spikes, one to several, surpassing the leaves, 50–200 mm. high, occasionally higher, appressed pubescent: *spikes thick, four- to twenty-flowered*, sometimes many-flowered, *erect, oval-capitate to oblong-cylindrical*, 10–20 mm. by 6–8 mm., glabrous or pubescent: *bracts small*, rigid, *thick, herbaceous, scarious-sided, about one half as long as the sepals, ovate, obtuse or acute*, with a few spreading hairs to sparingly villous: flowers perfect: *calyx* with spreading hairs, its *divisions* thick, *herbaceous, scarious-sided, green to brownish*, oblong, obtuse, 3 mm. long: *corolla* with the tube just surpassing the calyx, its *lobes* strongly reflexed, *two to three times as long as the constricted dark brown throat, orbicular, obtuse or abruptly apiculate*, 2.25 mm. by 2 mm., *white*: stamens shorter than the petals or very long-exserted from the tube: *pyxis one third surpassing the calyx*, ovate, truncate or retuse, 4–5 mm. by 2 mm., *circumscissile at the lower third, purple*: seeds two, dark brown, oblong, finely pitted.

Seventy sheets or specimens have been examined from California, as follows: 18 in the U. S. National Herbarium, 11 in the Gray Herbarium, 9 in the Herbarium of the Missouri Botanical Garden,

2 in the Columbia University Herbarium, 5 in the Herbarium of the Field Columbian Museum, 21 in the Herbarium of the California Academy of Sciences, 4 in Dr. E. L. Greene's Herbarium.

16. **Plantago tetrantha** sp. nov.

A *low green and purplish acaulescent annual, with a filiform root*, glabrous to pubescent, depauperate forms villous: *leaves* basal, *strictly erect, very slender*, several, *linear-subulate, truncately callous-tipped*, entire and involute towards the apex, *sessile and slightly clasping*, 40 50 mm. by 1 mm., *without venation*, glabrous: *scapes* basal, *erect, filiform, one or two in number, surpassing the leaves*, 80–120 mm. high, puberulent at the summit: *spikes small, two- to four (to five)-flowered*, erect, *capitate*, 4–8 mm. by 3–6 mm., slightly pubescent: *bracts scarious, with rigid callous-tipped apex, onethird as long as the sepals, broadly ovate*, narrower in depauperate forms, *apiculate by the callous tip*, 1.5 mm. by 1.2 mm., pubescent or glabrate: *flowers* perfect, *opposite in pairs as in a short interrupted spike: calyx* puberulent, *with or without scarious margins*, green to purple, its *divisions* oblong, *obtuse*, 3 mm. long: *corolla lobes* spreading, somewhat reflexed, *round-ovate, obtuse*, 3 mm. by 2.25 mm., *white, dark brown at the base:* stamens four, long-exserted; style equalling the petals: *pyxis circumscissile at the lower third.*

Seven sheets or specimens have been examined from northern California and Oregon, as follows: 4 in the U. S. National Herbarium, 2 in the Herbarium of the Missouri Botanical Garden, 1 in my own herbarium. Type specimen is R. A. Plaskett's no. 55, from the Santa Lucia Mountains, Monterey County, California, March, 1898, in the U. S. National Herbarium.

In several of the above species the differential characters are minute, but they are constant. In *P. aristata* the extremes would be somewhat puzzling without the intermediate forms. In all the species with oblong to ovate bracts, the habit and appearance of the plants alone (to say nothing of anatomical characters) suffice for their ready recognition.

DEPT. OF BIOLOGY, WASHINGTON, D. C., HIGH SCHOOLS.

Some Florida Fungi

By F. S. Earle

I have recently had the pleasure of examining two small lots of Florida fungi. The larger one was collected by P. H. Rolfs, and the smaller by S. M. Tracy. The following seem to be either new or noteworthy :

Asterina sabalicola sp. nov.

Mycelium widely effused, consisting of branching and anastomosing, septate, somewhat nodular and irregular, brownish hyphae from 3–5 μ in diameter : pseudo-perithecia 100–150 μ, formed by radiating septate hyphae about 3 μ in diameter, the free ends of which form a sterile fringe or subiculum, cells of these perithecial hyphae about 6 μ long : asci ovate, thin-walled, rather persistent, about 60 × 25 μ : ascospores sub-biseriate, oval, hyaline or faintly olivaceous, about equally uniseptate, 20 × 8 μ.

On living leaves of *Sabal* sp. Florida. P. H. Rolfs, no. 4.

The genus *Asterella* was proposed by Saccardo for the species of *Asterina* with hyaline spores, and it is recognized by Lindau (Engler & Prantl, **1**[1]: 340). It is possible that this species should be referred to the latter genus. The ascospores are, however, unmistakably tinted, and in older specimens it is probable that the color would be darker. This character at best is a very slender one for generic distinction when taken alone, and in this case the name *Asterella* is preoccupied by a genus of the Hepaticae, and is, therefore, untenable.

This is very different from the so-called *Asterina inquinans* E. & E. (N. A. F., no. 1785). The latter has no visible mycelium, and the naked sub-carbonaceous black perithecia are thickly scattered over the surface of the leaf. The ascospores seem to be uniformly continuous (Ellis says "faintly uniseptate ?") and hyaline or very faintly tinted. These characters would place it in the genus *Myiocopron* not in *Asterina* in which as now understood there is a superficial mycelium.

Ophiodothis atramentosa (B. & C.) Earle, nom. nov.

Hypocrea astramentosa B. & C. Jour. Linn. Soc. **10**: 377. 1868.

Epichloë Hypoxylon Peck, Reg. Rep. **27**: 108. D. 1875.

Dothidea vorax B. & C. Grevillea, **4**: 105. Mh. 1876.

Dothidea atramentaria B. & C. Grevillea, **4**: 105. Mh. 1876.

Ophiodothis vorax Sacc. Syll. Fung. **2**: 652. Je. 1883.

Dothichloë Hypoxylon Atk. Bull. Torr. Club, **21**: 223. My. 1894.

I refer here as being typical of this much named species, Rolf's no. 22, on an unknown grass from Lake City, Florida, Oct., 1896.

The stroma is crust like, often 2.3 cm. long and is slightly roughened throughout by the small, numerous, slightly papillate osteola.

A word is perhaps necessary in regard to the selection of the above name for this species. *Hypocrea atramentosa* B. & C. seems to have been founded on material from both Cuba and Alabama. There can be little question but that the Alabama material at least represented the same species that was later described as *Epichloë Hypoxylon* Peck and *Dothidea vorax* B. & C. If it should prove that the Cuban material differs from Peck's a specific name would have to be adopted for the form found in the United States. Atkinson's proposed genus *Dothichloë* has not been recognized by either Saccardo (Hedwigia, **35**: 34), nor by Lindau (Engler & Prantl. Nat. Pflanzfam.). The characters by which he seeks to separate it from *Ophiodothis* seem rather slight and even if, as he suggests, the character of the stroma of such species as *O. Haydeni* (B. & C.) Sacc. are sufficiently different to constitute a good generic distinction, the name *Ophiodothis* would, according to the method of generic types, now happily being somewhat widely recognized, have to remain with the present species, as it is the first one mentioned under this generic name. *Dothidea atramentaria* B. & C. and *D. pilulaeformis* B. & C. are recognized as varieties of this species by Saccardo. In the case of the former (see Rav. Fung. Amer. no. 100) there seems to be nothing on which to base a varietal distinction and it is therefore here included as a synonym. The latter (see Tracy's no. 167 on

Uniola, Ocean Springs, Mississippi, Sept., 1889) is quite distinct and is well worthy of varietal if indeed not of specific rank. The stroma is short, normally 1–2 mm. long (by confluence 1 cm. or more) but very much thickened, often seeming nearly globular. The perithecial cavities and osteola are much as in the type. The name for this latter fungus may be tentatively written as *Ophiodothis atramentosa pilulaeformis* (B. & C.).

Ophiodothis atramentosa Aristidae (Atk.)

Dothichloe Aristidae Atk. Bull. Torr. Club, **21**: 24.

On an unknown grass (probably *Aristida*), Lake City, Fla., June, 1895. P. H. Rolfs, no. 44.

This was given specific rank by Atkinson, and perhaps justly so, but as the following variety is intermediate in character between this and the type it seems best, for the present, to consider all of these forms as varieties, especially as they are so closely alike in their ascospores and asci. The distinguishing features of this form are the rongher more prominent ostioles and the interrupted or broken character of the fertile part of the stroma.

Ophiodothis atramentosa Cyperi var. nov.

Stroma interrupted, being formed of a thin sterile and of elevated fertile portions, the fertile tracts 1–2 mm. long by half as wide, perithecial cavities and ostioles as in the type.

On culms, leaves and bracts of *Cyperus ovularis*, Sneed's Island, Fla., Sept., 1899. S. M. Tracy, no. 6496.

DICHAENA STRUMOSA Fr.

On twigs of *Quercus*, St. Petersburg, Fla., July, 1894. P. H. Rolfs, no. 33.

This seems to be the first time that this interesting fungus has been taken with well-developed asci and ascospores; at least no description of these bodies has been published. The conidial form was distributed by Ellis, from New Jersey, as N. A. F. no. 3332. The Florida material agrees closely with this in the character of the distortions produced on the host and in general appearance, though the conidia seem slightly larger and broader. This conidial stage is referable to the form genus *Psilospora*, but it seems never to have been given a specific name under that genus.

I note the following characters from the Florida specimens:

Causing wart-like, often confluent distortions, 1 cm. in diameter: perithecia densely gregarious, innate-erumpent, black, carbonaceous, often flexed or irregular from crowding, lips somewhat widely open, about 1 × ⅓ mm.: conidia-bearing perithecia smaller and less distinctly hysteriform: conidia obovate, continuous, granular, hyaline to brownish, 28–30 × 12 μ: conidiophores about 20 × 4 μ, straight and stiff: asci nearly sessile, broadly oval, thin walled, 80–120 × 20–25 μ, paraphyses numerous, crowded, simple, the tips forming a brownish epithecium, about 120 × 3 μ: ascospores inordinate or partially biserrate, oval, continuous, minutely granular, light brown, closely packed in the ascus and often somewhat distorted by mutual pressure, 20–25 × 16–18 μ.

Lembosia camphorae sp. nov.

Epiphyllous: spots orbicular, nearly black with a narrow brownish border, 3–5 mm., in diameter, rarely confluent: perithecia thickly scattered over the central portion of the spot, often by confluence forming considerable crusts, single perithecia elongate, straight or slightly flexed, rather flat not prominent, lips somewhat widely open, averaging about 500 × 100 μ, surrounded by a rather scanty subiculum of slender occasionally septata, flexuous, anastamosing, brown threads about 3 μ, in diameter, the subiculum reaching 100 μ, in width: asci broadly oval, thin-walled, 8-spored, about 25 × 20 μ: ascospores inordinate, oval, slightly curved, about equally uniseptate, conspicuously constricted, ends subacute, faintly olivaceous, becoming light brown at full maturity, about 18 × 6 μ.

On living leaves of *Camphora officinalis*, Florida. P. H. Rolfs, no. 32.

Leptothyrium? carbonaceum sp. nov.

Amphigenous but mostly epiphyllous, not spotting or discoloring the leaf: perithecia irregularly scattered, large, about 1 mm., black, shining, carbonaceous, not distinctly parenchymatous, scutellate, central fertile portion strongly elevated, with a minute, central papillate imperforate osteolum, bordered by a flat sterile margin, often confluent, two or three together: sporules numerous, irregularly oval, yellowish, continuous, rather thick-walled, about 16–20 × 8–10 μ.

On unknown living coriaceous leaf. Lemon City, Fla., Feb., 1898. P. H. Rolfs, no. 39.

This conspicuous fungus is doubtless the immature stage of some species of the Microthyriaceae. It has little in common with the minute membranous species usually referred to *Leptothyrium*.

An Enumeration of the Plants collected by Dr. H. H. Rusby in South America, 1885–1886, XXX

By H. H. Rusby

(Continued from Bull. Torr. Club, **27**: 84. 17 F. 1900.)

Salvia Bridgesii Britton, sp. nov.

Scurfy-tomentose, gray: stems erect or ascending, reddish, obtusely quadrangular, very leafy: petioles .5–1.5 cm. long, slender or stoutish: blades 3–6 cm. long, .7–1.5 cm. broad, lanceolate or lance-ovate, blunt to rounded at the base, acute or obtuse, finely crenate or crenate-dentate, thickish, above dark-green, minutely velutinous, finely bullate by the strongly impressed, finely reticulate venation, underneath bright-gray, the reddish midrib and 12–15 pairs of strongly ascending secondaries very prominent: bracts varying from ovate and 5 mm. long, to linear-attenuate and more than 1 cm. long: calyx (in flower) 1.5 cm. long, lipped one third of its length: corolla 2 cm. longer than the calyx, slender: stamens 5 mm. exserted, the nearly semicircularly curved anthers 3 mm. long, or nearly 4.5 mm. long if straightened, longer style-branch nearly 2 mm. long.

Vic. La Paz, 10000 ft., Apr., 1885 (no. 1496). The same as Mandon's no. 510. Dr. Britton says also collected by Bridges and Pearce, and nearest to *S. bullulata*.

Dr. Britton regards Rusby's no. 2439 as the same. Its leaves are much smaller, its calyx (in flower) 8 mm. long, its corolla 2 cm. long.

Perilomia ocimoides H.B.K. Nov. Gen. et Sp. **2**: 328. Yungas 4000 ft., 1885 (no. 2155).

Marrubium vulgare L. Sp. Pl. 583. Near Valparaiso, Chili, June, 1885 (no. 1063).

Stachys Bogotensis H.B.K. Nov. Gen. et Sp. **2**: 309. Unduavi, 8000 ft., Oct., 1885 (no. 1495), and Sorata, 10000 ft., Feb., 1886 (no. 1494).

Stachys repens Mart. et Gal. in Bull. Acad. Brux. **11**: 194. 1844. Sorata, 10000 ft., Feb., 1886 (no. 2413). The same as Mandon's no. 521.

PLANTAGINACEAE.

Plantago litorea Phil. Fl. Atac. 46. Sorata, 10000 ft., Feb., 1886 (no. 2607).

Plantago tomentosa Lam. Illustr. **1**: 340. Vic. La Paz, 10000 ft., April, 1885 (no. 666), Yungas, 4000 ft., 1885 (no. 667) and (?), Unduavi, 8000 ft., Oct., 1885 (no. 665).

Plantago major L. Sp. Pl. 112. Yungas, 6000 ft., 1885 (no, 668).

NYCTAGINACEAE

Oxybaphus bracteosus Griseb. in Goelt. Abh. **19**: 86. 1874. Yungas, 4000 ft., 1885 (no. 2688).

Oxybaphus micranthus Choisy in DC. Prod. **13**: 432. Vic. La Paz, 10000 ft., April, 1885 (no. 2868).

Boerhaavia viscosa Tag. & Rod. Anal. Cienc. Nat. **4**: 256, no. 12. Yungas, 6000 ft., 1885 (no. 906).

Boerhaavia erecta L. Sp. Pl. 3. Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 904).

Collignoma parviflora (H.B.K.) Endl. Gen. 311. Unduavi, 8000 ft., Oct., 1885 (no. 2706), and Sorata, 10000 ft., Feb., 1886 (no. 2705). The same as Mandon's no. 1007. The plant climbs, by reclining, to the height of 8 or 10 ft. in hedges. Its white bracts render it both conspicuous and handsome.

Pisonia hirtella H.B.K. Nov. Gen. et Sp. **2**: 217. Mapiri, 25000 ft., May, 1886 (no. 2500). The same as Mandon's no. 1009.

Pisonia Boliviana Britton, sp. nov.

Younger portions, inflorescence, petioles, etc., sparsely ferruginous-pubescent; branchlets short, weak, flexuous, spreading or recurved, leafy at the summit: petioles .5–1 cm. long, broad: blades .6–1.5 cm. long, 3–8 cm. broad, oval, varying to ovate or obovate, inaequilateral, abruptly or cuneately narrowed at the base, shortly and obtusely abrupt-pointed at the apex, entire, dark-green above, pale underneath, rather thin, the 8–10 pairs of slender, straight principal secondaries diverging nearly at right angles, connecting near the margin, alternating with lesser ones: peduncles about 1 cm. long, weak: panicles 1 or 2 cm. long and broad, loosely branched: flowers sub-sessile: bracts whitish, thickish, 1 mm. long, oval-ovate, obtuse, strongly ciliate: peri-

gone 4 mm. long, 2 mm. broad at the summit, campanulate-turbinate, the margin sinuately 5-lobed and plicate: stamens 10, exserted, the filaments thickened, united at the base: the anthers .5 mm. long and broad: pistillate flowers not seen.

Junction of Rivers Beni and Madre de Dios, Aug., 1886 (no. 2502). No. 2501, from the same place, is immature. Dr. Britton regards it as the same, but this cannot be definitely stated from the material at hand.

Neea longipedunculata Britton, sp. nov.

Younger portions of the stem and lower leaf-surfaces pubescent: branchlets stoutish, striate: petioles 2–5 mm. long, stout and broad: blades .5–1.5 dm. long, 2.5–5 cm. broad, obovate, mostly blunt or rounded at the base, abruptly short-acuminate and obtusish at the apex, entire, the venation very slender, inconspicuous both sides, the secondaries very irregular, communicating near the margin: flowers dioecious: peduncles of the pistillate flowers about .5–1.5 dm. long, sub-filiform: panicles 2–6 cm. broad, loosely flowered, triangular-subulate bracted, the bracts about 1 mm. long: flowers blackish as dried, sub-sessile, oblong with contracted mouth, 1 cm. long, 3 mm. broad, the lobes 2 mm. long, lightly recurved.

Reis, 1500 feet, June, 1886 (no. 2709).

Neea macrophylla Britton, sp. nov.

Glabrous, drying blackish: branchlets stout, terete or angular at the summit: petioles 1 or 2 cm. long, very stout, sharply margined: blades 1.5–2 dm. long, .75–1 dm. broad, oval, rather abruptly narrowed into the petiole, short-acuminate and very acute, entire, membranous, the midrib and 12–16 pairs of slender secondaries lightly prominent above, strongly so underneath, the latter interarching at some distance from the margin, connected by the rather few, coarse tertiaries: cyme compound, shortly and stoutly peduncled, 1 dm. broad, the branches minutely ferruginous, thick and flattened after pressure: flowers sub-sessile, rather densely grouped: bracts lance-linear, slenderly acuminate, 1–2 mm. long: flowers (only the staminate seen) scarcely 1 cm. long, 3–4 mm. broad as pressed, oblong, contracted toward the summit of the tube, the 5 lobes a little more than 1 mm. long and rather broader, ovate, obtuse, thickened, papillose: stamens 8, the longest less than half the length of the corolla, the filaments thickened but weak, the anthers nearly 1 mm. long, almost as broad, light yellow, with a large black connective: pistil none.

Junction of Rivers Beni and Madre de Dios, Aug., 1886 (no. 2119). Dr. Britton says: "also collected by Pearce at Monterico, 3000–4000 ft., March, 1867."

Species peculiar in having the staminate flowers elongated.

Cryptocarpus pyriformis H.B.K. Nov. Gen. et Sp. **2**: 188. *pl. 124.* Yungas, 6000 ft., 1885 (no. 2497).

ILLECEBRACEAE

Pentacaena ramosissima (Weinm.) H. & A. Hook. Bot. Misc. **3**: 338. 1833 (*Loeflingia ramosissima* Weinm. Flora, **2**: 608. 1820). Sorata, 8000 ft., Feb., 1886 (no. 1524).

Herniarca setigera Gill. Hook. Bot. Misc. **3**: 337. 1833. Yungas, 6000 ft., 1885 (no. 1791).

AMARANTACEAE

(All the specimens pertaining to this family were taken for study by Professor Dr. Hans Schinz. No report has been received and there are no specimens in hand for our enumeration.)

CHENOPODIACEAE

Chenopodium ambrosioides L. Sp. Pl. 219. Vic. La Paz, 10000 ft., Apr., 1885 (no. 1421).

Atriplex Rusbyi Britton, Mem. Torr. Club, **4**: 250. Yungas, 6000 ft., 1885 (no. 1529).

Atriplex sp. (?)

Glabrous: stems filiform, twining: petioles 5–7 mm. long-rather broad: blades 1–2 cm. long, 4–8 mm. broad, triangular, lanceolate, shallowly cordate at the base, acuminate and acute, entire, 3–5-nerved, the nerves rather conspicuous on both sides: upper leaves becoming linear: racemes 2 or 3 cm. long, the peduncles about 1 cm. long, filiform, remotely-flowered, the flowers clustered: bracts about 1 mm. long and broad, ovate, green with white-scarious, ciliate margins: pedicels less than 1 mm. long, about as long as the flower: flowers staminate, the purplish perianth deeply 6-lobed: stamens 6, the anthers didymous, with a broad connective.

Unduavi, 8000 ft., Oct., 1885 (no. 2545). With the slender, twining habit and inflorescence of *Boussingaultia*, this species presents the staminate flowers and didymous anthers of *Atriplex*.

Salicornia Peruviana H.B.K. Nov. Gen. et Sp. **2**: 193. Pisco, Peru, Feb., 1885 (no. 1528).

Boussingaultia marginata (Moq.) Britton (*Tandonia marginata* Moquin; DC. Prod. **13**: 226). Vic. La Paz, 10000 ft., Oct., 1885 (no. 2570). The same collected by Holton at Chauchi, June 18, 1854, and in Herb. Kew. sub "*T. cordifolia.*"

PHYTOLACCACEAE

Villamilla octandra (L.) Hook. f. in B. & H. f. Gen. **3**: 81 (*Rivina octandra* L. Cent. Pl. **2**: 9). Guanai, 2000 ft., May, 1886 (no. 1353), and Junc. Rivers Beni and Madre de Dios, Aug., 1886 (no. 741).

Villamilla racemosa Britton, Mem. Torr. Club, **4**: 261. Yungas, 6000 ft., 1885 (no. 743).

Petiveria alliacea L. Sp. Pl. 342. Mapiri, 5000 ft., Apr., 1886 (no. 1368).

Microtea Muypurensis (Kunth.) G. Don, Lond. Hort. Brit. ed. 2, 98, n. 6423 (*Ancistrocarpus Muypurensis* Kunth. Humb. et Bonp. Nov. Gen. et Sp. **2**: 186. n. 1. *pl. 122*). Beni River, July, 1886 (no. 1379).

Phytolacca octandra L. Sp. Pl. ed. 2. 631. Unduavi, 8000 ft., Oct., 1885 (no. 1961).

Phytolacca thyrsiflora Fenzl. West. Fl. Bras. **14**^{2}: 343. Mapiri, 5000 ft., Apr., 1886 (no. 742).

POLYGONACEAE

Rumex cuneifolius Campd. Monog. Rum. 66, 95. Vic. La Paz, 10000 ft., Apr., 1885 (no. 1526).

Rumex conglomeratus Murr. Prod. Fl. Gott. 52. Near Valparaiso, Chili, June, 1885 (no. 1525) and Sorata, 10000 ft., Feb., 1886 (no. 1525). The same as Mandon's no. 1036.

Sarcogonum Chilensis (Meissn.) (*Muhlenbeckia Chilensis* Meissn.; DC. Prod. **14**: 148). Vic. La Paz, 10000 ft., Apr., 1885 (no. 1026). The same as Lechler's no. 541.

Sarcogonum fruticulosum (Walp.) Rusby, Mem. Torr. Club, **4**: 251. Vic. La Paz, 10000 ft., Apr., 1885 (no. 1962). The same as no. 132.

Sarcogonum tamnifolium (H.B.K.) Rusby, Mem. Torr. Club, **6**: 111. Sorata, 8000 ft., Feb., 1886 (no. 628), and Unduavi, 8000 ft., Oct., 1885 (no. 1426).

Sarcogonum vulcanicum (Endl.) Rusby, Mem. Torr. Club, **4**: 252. Vic. La Paz, 10000 ft., Oct., 1885 (no. 630).

Uvifera Illhaensis (Wedd.) Kuntze, Rev. Gen. Pl. 561 (*Coccoloba Illhaensis* Wedd. Ann. Sci. Nat. III. **10**: 258. 1850. Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 1380).

Uvifera strobibulifera (Meissn.) (*Coccoloba strobilulifera* Meissn.; Mart. Fl. Bras. **5**[1]: 25). Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 2624).

Uvifera Meissneriana Britton, sp. nov.

Younger portions, inflorescence and lower leaf-surfaces pubescent and slightly ferruginous: branchlets stout, strongly striate or costate: petioles 5 mm. long, very stout and broad: blades 5–1.5 dm. long, 3–6 cm. broad, obovate, abruptly and acutely short-pointed, rigid, pale-green, the coarsely reticulate slender venation prominent on both sides: spikes sessile, 5–6 cm. long, the rachis stout, coarsely angled, densely flowered: catkins 6–8 cm. long, 5 or 6 mm. thick, densely flowered, deep-brown: pedicels 1–2 mm. long, stout: perianth 2 mm. long, the segments ovate or oval, obtuse: filaments about 1 mm. long, flattened and much broadened below, the anthers less than .5 mm. long: pistil about 1 mm. long, the ovary conical-ovoid, the style stout with slender branches.

Guanai, 2000 ft., May, 1886 (no. 1918).

Mr. Bang's no. 1595, probably collected at the same place, is the same, in fruit. The fruit is 5 mm. long, globular-ovoid, obtuse, lightly angled, deep-brown.

Triplaris hispida Britton, Mem. Torr. Club, **6**: 111. Guanai, 2000 ft., May, 1886 (no. 1309), and Beni River, July, 1886 (no. 1424).

Triplaris efistulifera sp. nov.

Pistillate plant, in fruit, only seen: glabrous, except the ferruginous tomentose inflorescence: branches, elongated, blackish, solid, the internodes about 2 cm. long: sheaths annular, about 1 cm. long: petioles .7–1 cm. long, very broad, blackish: blades 1.5 dm. long, 6 cm. broad, oval, blunt at the base, acuminate, thickish, lightly shining above, pale underneath, where the midrib and about 14 pairs of upwardly curved secondaries are very prominent, the venation very finely reticulate: spikes terminal, panicled,

.5–1 cm. long, 1 cm. thick, subtended by sheaths similar to those of the leaves: bracts sessile, nearly 1 cm. long, splitting through the lower side, hirsute: pedicel 3 mm. long, very stout, densely yellowish hirsute, lightly recurved, the fruit disarticulating from its blackish summit: tube of the perianth 1.5–2 cm. long, contracted toward the summit and above the fruit, somewhat dilated, pubescent, the outer lobes nearly 3 cm. long, nearly 1 cm. broad, oblanceolate, obtuse, red, strongly veined, the inner nearly 2 cm. long, linear, obtusish, thick and rigid, lying closely in the angles between the wings of the smooth fruit, which is 1.5 cm. long, inclusive of the styles, nearly 1 cm. broad, strongly winged, short beaked: the persistent styles 2–3 mm. long.

Yungas, 6000 ft., 1885 (no. 1425).

Triplaris Boliviana Britton, sp. nov.

Twigs and veins of the lower leaf-surface minutely puberulent, the inflorescence gray-tomentose: branchlets fistulous, very stout, reddish, the sheaths mere rings: petiole (but one seen) 1.5 cm. long, 4 mm. broad, very stout: blade 3.5 dm. long, 2 dm. broad, regularly ovate, rounded at the base, acute (?) at the apex, entire, thickish, the terete and very stout midrib, and about 25 pairs of nearly straight secondaries very prominent underneath, the latter spreading at an angle of about 60°, interarching near the margin, connected by the crooked tertiaries: spikes fascicled along the rachis, mostly branched at the base, .75–2.5 dm. long, 6 or 7 mm. thick, with the flowers not yet expanded, very densely flowered, gray-tomentose: bracts 3 mm. long, 5 mm. broad when flattened, densely white-hirsute, the bractlets similar but smaller: buds globoidal, a little more than 1 mm. in diameter: perianth hirsute, deeply parted, the lobes 1.25 mm. long, oblong, obtuse: stamens exserted, the anthers reddish, large: pistillate flowers not seen.

Junction of Rivers Beni and Madre de Dios, Aug., 1886 (no. 1243).

PIPERACEAE.

Piper angustifolium Fl. Per. **1**: 38. Yungas, 6000 ft., 1885 (no. 2175).

Piper Blanchetii (Miq.) C. DC. Prod. **16**: 318 (*Artanthe Blanchetii* Miq. Syst. Pip. 473). Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 2183).

Piper calocoma (Miq.) C. DC. Prod. **16**: 264 (*Artanthe calo-*

coma Miq.; Seem. Bot. Voy. Herald 199). Guanai, 2000 ft., May, 1886 (no. 2190).

Piper Hookeriana (Miq.) C. DC. Prod. **16**: 292 (*Artanthe Hookeriana* Miq.; Hook. Lond. Journ. Bot. **4**: 446. 1845). Mapiri, 2500 ft., May, 1886 (no. 2187).

Piper obliquum R. & P. Fl. Per. **1**: 37. *pl. 63. f. a.* Mapiri, 5000 ft., Apr., 1886 (no. 2174).

Piper lanceolatum R. & P. Fl. Per. **1**: 36. Unduavi, 8000 ft., Oct., 1885 (no. 2178).

Piper Gaudichaudianum Kunth in Linnaea, **13**: 639. 1839. Guanai, 2000 ft., May, 1886 (no. 2179).

Piper Mapirense C. DC. Bull. Torr. Club, **19**: 47. 1892. Mapiri, 2500 ft., May, 1886 (no. 2180).

Piper oxyphyllum C. DC. Bull. Torr. Club, **19**: 48. 1892. Yungas, 4000 ft., 1885 (no. 2176).

Piper Pavonii (Miq.) C. DC. Prod. **16**: 294. Mapiri, 5000 ft., April, 1886 (no. 2185). The same as Bang's no. 2642.

Piper psilophyllum C. DC. Bull. Torr. Club, **19**: 47. 1892. Unduavi, 8000 ft., Oct., 1885 (no. 2186).

Piper pseudo-peruvianum C. DC. Prod. **16**: 282. Mapiri, 2500 ft., May, 1886 (no. 2181).

Piper Rusbyi C. DC. Bull. Torr. Club, **19**: 47. 1892. Yungas, 4000 ft., 1885 (no. 2188).

Piper tenue H.B.K. Nov. Gen. et Sp. **1**: 560. Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 2184). The same as Mathew's no. 1708.

Piper tuberculatum Jacq. Ic. Pl. Par. **2**: 2. *pl. 21.* Guanai, 2000 ft., May, 1886 (no. 2177). The same as Holton's no. 239.

Piper umbellatum L. Sp. Pl. 30. Mapiri, 5000 ft., April, 1886 (no. 2173).

Piper Warakaboura (Miq.) C. DC. Prod. **16**: 257 (*Artanthe Warakaboura* Miq.; Hook. Lond. Journ. Bot. **4**: 469. 1845. Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 2182).

Piper sp. undeterminable. Yungas, 6000 ft., 1885 (no. 2189).

Peperomia ciliata H.B.K. Nov. Gen. et Sp. **1**: 68. Unduavi, 8000 ft., Oct., 1885 (no. 2169); Yungas, 4000 ft. (no. 2195) and 6000 ft. (no. 2193).

Peperomia circinata Link. Bot. Jahrb. **1**: 64. 1820. Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 2208).

Peperomia distachya (L.) A. Dietr. Sp. Pl. **1**: 156 (*Piper distachyon* L. Sp. Pl. 30). Mapiri, 2500 ft., May, 1886 (no. 2192).

Peperomia talinifolia longipetiolata C. D.C. Yungas, 6000 ft., 1885 (nos. 2200 and 2212) and Mapiri, 2500 ft., May, 1886 (no. 2215).

Peperomia galioides H.B.K. Nov. Gen. et Sp. **1**: 71. *pl. 17.* Mapiri, 5000 ft., Apr., 1886 (no. 2201).

Peperomia heterophylla Miq.; Hook. Lond. Journ. Bot. **4**: 415. 1845. Mapiri, 5000 ft., Apr., 1886 (no. 2209).

Peperomia heterostachya A. Dietr. Sp. Pl. **1**: 717 (index). Yungas, 6000 ft., 1885 (no. 2213).

Peperomia Hilariana Miq. Syst. 89? Yungas, 6000 ft., 1885 (no. 2211).

Peperomia Langsdorffii Miq. Syst. 116. Unduavi, 8000 ft., Oct., 1885 (no. 2197).

Peperomia Larecajana C. DC. Prod. **16**: 406. Yungas, 4000 ft., 1885 (no. 2210a).

Peperomia linearis C. DC. Journ. Bot. **4**: 145. 1866. Yungas, 6000 ft., 1885 (no. 2206).

Peperomia melanostigma Miq. Syst. 90. Yungas, 6000 ft., 1885 (nos. 2191 and 2199).

Peperomia myriocarpa Miq. Syst. 185. Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 2194).

Peperomia nummularifolia (Sw.) H.B.K. Nov. Gen. et Sp. **1**: 66 (*Piper nummularifolium* Sw. Prod. Veg. Ind. Occ. 16). Falls of Madeira, Brazil, Oct., 1886 (no. 2207).

Peperomia pseudo-furcata C. DC. Prod. **16**: 399. Mapiri, 5000 ft., Apr., 1886 (no. 2205).

Peperomia reflexa A. Dietr. Sp. **1**: 180. Yungas, 6000 ft., 1885 (no. 2203) (?) and Falls of Madeira, Brazil, Oct., 1886 (no. 2202).

Peperomia psilostachya C. DC. in M. DC. Phyll. Yungas, 6000 ft., 1885 (no. 2210).

Peperomia Rusbyi C. DC. Bull. Torr. Club, **19**: 49. 1892. Yungas, 6000 ft., 1885 (no. 2214).

Peperomia septemnervis R. & P. Pl. Per. **1**: 31. *pl. 47. f. c.* Yungas, 6000 ft., 1885 (no. 2198).

Nos. 2204, 2216 and 2588 are species of *Peperomia*, collected at Unduavi, Oct., 1885.

CHLORANTHACEAE

Tafallaea glabrata (H.B.K.) Rusby, Mem. Torr. Club, **4**: 252. Mapiri, 2500 ft., May, 1886 (no. 2499), and Yungas, 4000 ft., 1885 (no. 2498).

MYRISTICACEAE

Myristica sebifera (Aubl.) Sw. Fl. Ind. Occ. 1129. Mapiri, 2500 ft., May, 1886 (no. 1216) and Guanai, 2000 ft., May, 1886 (no. 1217).

MONIMIACEAE

Mollinedia Rusbyana Perkins. Mapiri, 2500 ft., May, 1886 (no. 2620). The same as Bang's no. 2430. Also collected by Pearce, Yungas, Jan., 1886.

Peumus Boldus Molino Sagg, Chili, 185. Near Valparaiso, Chili, June, 1885.

Siparuna limoniodora (R. & P.) A. DC. Prod. **16**: 646. Yungas, 6000 ft., 1885 (no. 2485). The same as Bang's no. 1183.

Siparuna obovata (Gardn.) A. DC. Prod. **16**: 644 (*Citrosma obovata* Gardn. Hook. Lond. Journ. Bot. **2**: 343. 1843). Yungas, 4000 ft., 1885 (no. 2586).

Siparuna Apiosyce (Mart.) A. DC. Prod. **16**: 645 (*Citrosma Apiosyce* Mart. ex Tul. Ann. Sci. Nat. IV. **4**: 34. 1855). Mapiri, 5000 ft., Apr., 1886 (no. 2486).

LAURACEAE

Aniba Amazonica (Meissn.) Mez. Jahrb. Berlin **5**: 69. 1889 (*Aydendron Amazonicum* Meissn. in DC. Prod. **15**: 89). Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 709).

Endlichera hirsuta (Schott.) Nees. in Linnaea **8**: 38. 1833 (*Cryptocarya hirsuta* Schott. in Spreng. Syst. **4**: App. 405). Yungas, 6000 ft., 1885 (no. 2506), and Beni River, July, 1886 (no. 710).

Endlichera dysodantha (R. & P.) Mez. Jahrb. Berlin, **5**: 119.

1889 (*Laurus dysodantha* R. & P. Fl. Per. **4**: *pl. 355*). Mapiri, 2500 ft., May, 1886 (no. 2671).

Persea gratissima Gaertn. Fruct. **2**: 222 (no. 2533).

Persea laevigata H.B.K. Nov. Gen. et Sp. **3**: 157. Yungas, 4000 ft., 1885 (no. 2505).

Persea scoparia Mez. Arb. Bot. Gart. Breslau, 115 (?). Mapiri, 2500 ft. (no. 2538).

Ocotea Guyanensis Aubl. Pl. Guy. **2**: 781. *pl. 310.* Guanai, 2000 ft., May, 1886 (no. 2639).

Ocotea Rusbyana Mez. Jahrb. Berlin, **5**: 303. 1889. Guanai, 2000 ft., May, 1886 (no. 2674).

Ocatea laxiflora (Meissn.) Mez. l.c. 371 (*Mespilodaphne laxiflora* Meissn; DC. Prod. **15**: 107. Guanai, 2000 ft., May, 1886 (no. 2672).

Nectandra Brittonii Mez. l. c. 435. Guanai, 2000 ft., May, 1886 (no. 2602).

Nectandra globosa (Aubl.) Mez. l. c. 415 (*Laurus globosus* Aubl. Pl. Gen. **1**: 364). Guanai, 2000 ft., May, 1886 (no. 706), and Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 708).

Nectandra laevis Mez. l. c. 451. Mapiri, 5000 ft., Apr., 1886 (no. 705).

Nectandra lanceolata Nees *et* Mart. Linnaea **8**: 47. 1833. Beni River, July, 1886 (no. 711).

Nectandra cuspidata Nees *et* Mart. Syst. Laurin, 330. Mapiri, 2500 ft., May, 1886 (no. 707).

Nectandra berchemifolia Meissn.; DC. Prod. **15**: 154. Mapiri, 2500 ft., May, 1886 (no. 712).

LORANTHACEAE

Phrygilanthus tetrandrus (R. & P.) Eichler; Mart. Fl. Bras. **5**^{2}: 47 (*Loranthus tetrandrus* R. & P. Fl. Per. **3**: 46. *pl. 275*). Near Valparaiso, Chile, June, 1885 (nos. 1531 and 1532).

Phrygilanthus punctatus (R. & P.) Eichler, l. c. (*Loranthus punctatus* R. & P. l. c. 47. *pl. 277. f. a*). Mapiri, 10000 ft., Apr., 1886 (no. 1530).

Phrygilanthus eugenioides (H.B.K.) Eichler, l. c. 50 (*Loranthus eugenioides* H.B.K. Nov. Gen. et Sp. **3**: 435). Mapiri, 5000 ft., Apr., 1886 (no. 1823). The same as Mandon's no. 1470.

Struthanthus concinnus Mart. Flora, **1**: 104. 1830. Yungas, 6000 ft., 1885 (no. 1534). Apparently the same as Burchell's no. 3693.

Phthirusa pyrifolia (H.B.K.) Eichler, l. c. 63 (*Loranthus pyrifolius* H.B.K. Nov. Gen. et Sp. **3**: 441. Junc. of Rivers Beni and Madre de Dios, Aug., 1886 (no. 1536).

Oryctanthes botryostachys Eichler, l. c. 89. *pl. 29.* (?) Reis, 1500 ft., June, 1885 (no. 1545). The same in Jenman's no. 2532 and Traill's no. 785 from the upper Amazon.

Loranthus (?) **cubeboides** sp. nov.

Glabrous: branches elongated, stoutish, mostly straight and little-branched, terete, striate, dark-colored, the internodes 3 or 4 cm. long, petioles 4–7 mm. long, stout: blades 3–6 cm. long, 2–3 cm. broad, ovate, rounded at the base, acuminate and acute, entire, moderately thick, the midrib and 9 or 10 irregular pairs of secondaries moderately prominent on the lower side; spikes 2–4 cm. long, short-peduncled, erect or ascending, slender, angled, the flowers about 3 or 4 cm. apart: pedicels 3 mm. long, stout, slightly thicker at the summit, angled, divergent, 2- or occasionally 3-flowered at the summit: calyx about 1 mm. long and broad, minutely and sharply toothed.

Mapiri, 5000 ft., Apr., 1886 (no. 1535).

Phoradendron acinacifolium Eichl., in Mart. Fl. Bras. **5**^{2}: 117. Falls of Maderia, Brazil, Oct., 1886 (no. 1542).

Phoradendron Balleanum (Seem.) Eichl. l. c. 134 (*Viscum Balleanum* Seem. Bot. Voy. Herald, no. 295. *pl. 63*). Yungas, 6000 ft. 1885 (no. 1540) (?) The same as Mandon's no. 1468.

Phoradendron clavatum (Benth.) Eichl. l. c. 107 (*Viscum clavatum* Benth. Pl. Hartw. 189). Ingenio del Oro, 10000 ft., May, 1886 (no. 1541).

Phoradendron coriaceum Eichl. l. c. 121. Mapiri, 2500 ft., May, 1886 (no. 1546).

Phoradendron latifolium (Sw.) Griseb. Mem. Am. Acad. II. **8**: 191. 1861 (*Viscum latifolium* Sw. Fl. Ind. Occ. **1**: 268). Mapiri, 2500 ft., May, 1886 (no. 1547). It is the same as a specimen in Herb. Kew., numbered "904," from Santarem; also collected by Jenman.

Phoradendron Mandonii Eichl. in Mart. Fl. Bras. **5**^{2}: 124 *in*

obs. Yungas, 6000 ft., 1885 (no. 1387). The same as Mandon's no. 497.

Phoradendron mesembryanthemifolium Griseb.

Lechl. Berb. Amer. Austr. 59 (name only)

Glabrous, very greatly and harshly wrinkled in drying: stems much-branched, the branches sub-erect, rather slender for the genus, sparsely leafy, the leaves falling readily: leaves sessile, about 1.5 cm. long, 3–5 mm. broad, oblanceolate, broadest near the blunt apex, very thick and fleshy: spikes 1.5–3 cm. long, nearly as broad as the leaves, 2–3-jointed, the joints gradually and regularly broadening upward to about twice the width of the basal portion: bracts (the pair) about 3.5 mm. broad, the upper margin about horizontal, each equilaterally triangular in lateral outline, acute: flowers moderately numerous, mostly above the middle of the joint, moderately imbedded: perianth-segments triangular ovate, obtuse, nearly 1 mm. long and broad.

Sorata, 8000 ft., Feb., 1886 (no. 1537).

The same as Mandon's no. 1466 and Bang's nos. 1926 and 2035.

Phoradendron Pearcei sp. nov.

Plant drying of a deep yellow color: stems 1–1.5 dm. long, densely short-branched, hispid with sharp upwardly directed warts: petioles 2 mm. long, 1 mm. broad, strongly concave on the upper surface: blades 3 or 4 mm. long, 4 or 5 mm. broad, ovate, the outline rounded: spikes 3–5 mm. long, 1–5-flowered, short-peduncled, the lower bracts small, the upper semi-circular, connate: sepals nearly blood red in color, about 1 mm. long and rather broader: pistil globoidal, less than .25 mm. in diameter: staminate flowers not seen.

Unduavi, 8000 ft., Oct., 1885 (no. 1539). The same collected by Bang without number.

Phoradendron Rusbyi Britton, sp. nov.

Glabrous, the leaves finely papillose: stems stoutish but weak, terete, irregularly branched, the branches elongated: petioles about 1 cm. long, very stout: blades .75–1.25 dm. long, 4–7 cm. broad, inaequilaterally ovate, rather abruptly narrowed into the petiole, acuminate, the actual apex not present in the specimens, entire, very thick, slenderly 5-nerved, the venation inconspicuous: spikes loosely panicled, the rachis very strongly flattened, the divisions gradually broadened toward the summit,

where it is sometimes 1–1.5 cm. broad, the branches elongated, divergent or sometimes slightly drooping: spikes 1.5–4 cm. long, about 5 mm. broad, the joints mostly 5–7 mm. long, irregular in number, mostly floriferous throughout their length, the flowers rather deeply immersed.

Mapiri, 5000 ft., April, 1886 (no. 1543).

Phoradendron inaequidentatum sp. nov.

Glabrous, the leaves finely papillose: branchlets short, stout, divergent: petioles .5–1 cm. long, very stout, margined: blades 5–7 cm. long, 3–4 cm. broad, obovate, abruptly contracted into the petiole, lightly, and for the most part very inaequilaterally retuse at the rounded or sub-truncate summit, entire, extremely thick: spikes mostly solitary or two together, simple, about 2 or 2.5 cm. long, 3 mm. broad, exclusive of the fruit: the joints 2–4 mm. long, 2-flowered at the summit, the flowers deeply immersed in pits having a sharply elevated light-colored, thin margin: fruit 4 mm. long, 3.5 mm. broad, conically ovoid, blunt or truncate, light-brown and granular, the summit lighter.

Guanai, 2000 ft., May, 1886 (no. 1544).

SANTALACEAE

Quinchemalium majus Brongn. Voy. Coquille. *pl. 51. f. a.* Near La Paz, 10000 ft., Apr., 1885 (no. 676). The same as Mandon's no. 1044.

EUPHORBIACEAE

Euphorbia geniculata Orteg. Hort. Matr. Dec. 18. Tacna, Chile, Mar., 1885 (no. 890); Guanai, 2000 ft., May, 1886 (no. 892); Falls of Madeira, Brazil, Oct., 1886 (no. 891). Also growing abundantly at Mapiri, in Cinchona plantations, as a weed.

Euphorbia chamaesyce L. Sp. Pl. 455? Vic. La Paz, 10000 ft., April, 1885 (no. 893).

Euphorbia hypericifolia L. Sp. Pl. 454? Vic. La Paz, 10000 ft., April, 1885 (no. 1375). The same as Mandon's no. 1063 and Bang's no. 2.

Euphorbia Peplus L. Sp. Pl. 456. Vic. La Paz, 10000 ft., April, 1885 (nos. 896, 898 and 899), and near Valparaiso, Chile, June, 1885 (no. 897). The same as Mandon's no. 1087. Grows very abundantly in cultivated ground, especially where irrigated, and on shaded, rocky banks.

Proceedings of the Club

ANNUAL MEETING, JANUARY 9, 1900

Vice-President Allen was in the chair, 33 persons present.

Three resignations were accepted, viz: Fredk. H. Comstock, 119 West 86th Street; Frank G. Hills, Canarsie, South Brooklyn, N. Y.; Henry W. Sackett, Tribune Building, New York.

Miscellaneous business included, 1st, The acceptance of an invitation from the American Geographical Society to send three delegates to unite in a commemorative meeting in honor of its late President, Charles P. Daly, the meeting to take place January 22d. The Club elected as such delegates, Dr. T. F. Allen, Dr. H. H. Rusby and Dr. N. L. Britton; 2d, The election to fill the one vacancy still existing in the Board of Associate Editors, of Dr. D. T. MacDougal as such Associate Editor; 3d, The conditional acceptance by the Club for a Decoration Day excursion of an invitation tendered by Dr. T. F. Allen to visit his country house at Litchfield, Conn., where his herbarium and the flora of Bantam Lake are among the attractions offered.

The committee appointed to consider a program for a Torrey Day in connection with the A. A. A. S. meeting here next summer reported through the Secretary, the following proposed program:

Historical Sketch of Botany in New York City, Dr. T. F. Allen; Personal Reminiscences of Dr. Torrey, Professor T. C. Porter; Work of Dr. Torrey as a Botanist with Bibliography, Dr. N. L. Britton; Exhibition of Botanical Material and of Letters Illustrative of Dr. Torrey's work, Miss A. M. Vail; Work of the Torrey Botanical Club, Professor Edward S. Burgess. Other features are under consideration.

Special business consisted, 1st, of Annual Reports. That of the Treasurer, Mr. Maturin L. Delafield, Jr., reported a cash balance in hand.

The Secretary, Professor Edward S. Burgess, reported an average attendance of 31 at the 15 meetings held during the year, one death, a present active membership of 237, corresponding

membership 142, honorary membership 3, total membership 382. Among the 18 scientific papers presented 5 had been accompanied by lantern views; 4 papers related to ferns. Nine illustrative exhibits of photographs, plates and flower paintings, etc., had been held.

The Editor, Professor L. M. Underwood, reported the regular monthly issue of the *Bulletin*, forming the largest volume published to date, including 650 pages besides 23 heliotype plates and 38 figures in the text, and including 65 articles representing 39 authors. The publication of the *Memoirs* has been carried on with unusual activity, including Dr. M. A. Howe's monograph on the Californian Hepaticae (208 pages, 35 plates), Mr. Tracy E. Hazen's "Life History of *Sphaerella lacustris*" (*Haematococcus pluvialis*) (33 pages, 2 colored plates) and the beginning of Professor F. E. Lloyd's Comparative Embryology of the Rubiaceae (21 pages, 4 plates).

Miss Marie L. Sanial, as Secretary of the Excursion Committee, reported 38 excursions held, with the new feature of excursions for bryological and other collections in December, at one of which 15 persons were present.

The annual election was then held, and the previous board of officers were elected.

The scientific paper of the evening was by Professor Francis E. Lloyd, on "The Relationship of certain Rubiaceae," forming part of an investigation in the embryology of that order now in course of printing among the Memoirs of the Torrey Club. The ground of relationship considered was the ovary, which is classed as inferior, but developmentally proves to be a receptacle hollowed out. The flower seems to be derived from one with more separate corolla-lobes. The Rubiaceae are very polymorphic externally, and there is the greater need of discovery of stable internal characters. Such characters for the ovary of the Stellatae were discussed in detail. That of the common buttonbush, *Cephalanthus*, was alluded to as possessing certain ovary characters in form and relatively rapid and prolonged growth of the basal partition which accord most significantly with the unusually compressed position of the ovary.

Discussion followed regarding the passages of pollen-tube through tissues rather than loosely in the cavity of the ovary. In

some Rubiaceae, said Professor Lloyd, these tubes seem stimulated by contact with the enlarged collar-cells of the funiculus and appear to owe their guidance into the micropyle to such stimulus. Dr. MacDougal remarked upon recent conclusions that pollen-tubes show negative reactions to oxygen, but positive to sugars, and to albuminoid substances in the ovary or near the embryo-sac.

EDWARD S. BURGESS,
Secretary.

31 JANUARY, 1900

Vice-President Rusby in the chair; 31 persons present. In the absence of the Secretary, L. M. Underwood was called to act *pro tem.*

Six persons who had been duly proposed for membership were elected, as follows:

Miss Violetta S. White, 560 Fifth Avenue.
Miss Louisa Bruckman, 1022 Lexington Avenue.
Miss Elise W. Kornmann, 1030 Park Avenue.
Miss Ida Clendenin, 67 Hancock Street, Brooklyn.
Professor A. W. Evans, Yale University, New Haven, Conn.
Dr. H. S. Washington, Locust, Monmouth County, N. J.

The program of the evening consisted of a paper on the "Cultivation of Palms," by Mr. Henry A. Siebrecht. After a general discussion of the palms as a botanical group and the various types represented in tropical regions, a full and interesting account was given of their cultivation in conservatories and as house plants; valuable suggestions were given for their treatment and care in the household. The characters of various species suitable for cultivation indoors were given, especially of the genera *Cocos*, *Kentia*, *Phoenix*, *Areca*, *Caryota*, *Licuala* and *Thrinax*, of which fine illustrations were shown from the writer's splendid nurseries. Among these were *Cocos Weddelliana*, *Phoenix Canariensis*, *P. rupicola*, *Areca lutescens*, and *Licuala grandis*.

An account of Mr. Siebrecht's extensive nurseries in the tropical regions of Trinidad was afterwards given by request of some of the members.

Discussion followed by Mr. Henshaw, Mr. Lighthipe and Dr. Rusby.

L. M. UNDERWOOD,
Secretary pro tem.

Index to recent Literature relating to American Botany

This Index is intended to include (1) Titles of all papers and books relating to American plants; (2) All papers on botanical subjects by American botanists; (3) Papers of special interest relating to physiological or morphological subjects wherever published. Botanists can aid greatly in this matter by the contribution of separates of their papers especially those published outside the usual botanical journals, such as the publications of learned societies, experiment station bulletins and reports, and journals only occasionally containing botanical matter.

The titles are reprinted monthly on standard library cards of two widths, and are sold to subscribers at the price of one cent per card.

The editors will welcome any notice of omitted titles or other suggestions relative to the greater efficiency of the Index. Address all matter relating to the Index to The Torrey Botanical Club, Columbia University, New York City.

Baker, E. G. Notes on *Malvaviscus*. Jour. Bot. **37**: 344–348. Au. 1899.

M. Polakowskyi and *M. brevibracteatus*, sp. nov., from Central America, and notes on other species.

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Briquet, J. Recherches anatomiques et biologiques sur le Fruit du Genre *Oenanthe*. Bull. Herb. Boiss. **7**: 467–488. 20 Je. 1896.

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Mnium nudum R. S. Williams.

Britten, J. Bibliographical Notes. XXI. Fraser's Catalogues. Jour. Bot. **37**: 481–487. N. 1899.

Britten, J., & Baker, E. G. On some species of *Cracca*. Jour. Bot. **38**: 12–19. Ja. 1900.

Burt, E. A. Key to the Genera of Basidiomycetes of Vermont. 1–18. Middleburg, Vt., 1899.

Campbell, R. Botany in the Island of Montreal. Can. Rec. Sci. **8**: 84–90. 30 D. 1899.

Chabert, A. Étude sur le Genre *Rhinanthus* L. Bull. Herb. Boiss. **7**: 425–450. 20 Je. 1899; 497–516. 25 Jl. 1899.

Includes *R. Kyrollae*, *R. Groenlandicus*, and *R. rigidus*, sp. nov. from America.

Chodat, R. Plantae Hasslerianae soit Énumération des Plantes récoltées au Paraguay par le Dr. Émile Hassler. Bull. Herb. Boiss. **7**: (Appendix 1). 59–87. 30 S. 1899.

Includes descriptions of new species and varieties in *Aristolochia*, *Froelichia*, *Telanthera*, *Jussieua*, *OEnothera*, *Cuphea*, *Cissus*, *Passiflora*, *Hydrolea*, *Tournefortia*, *Oxypetalum*, and *Manettia*.

Chodat, R. *Pleurococcus* et *Pseudo-Pleurococcus*. Bull. Herb. Boiss. **7**: 827, 828. 30 N. 1899.

Coulter, J. M., & Rose, J. N. A Synopsis of Mexican and Central American Umbelliferae. Proc. Wash. Acad. Sci., **1**: 111–159. Ja. 1900.

New species in *Museniopsis* (9), *Tauschia* (4), *Arracacia* (7), *Cicuta*, *Ligusticum*, *Conioselinum*, *Angelica*, *Prionosciadium* (9), *Deanea* (5) and *Coulterophyllum* (3).

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Farlow, W. G. Botanical Bibliography. Bot. Gaz. **29**: 64–67. 31 Ja. 1900.

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Hochreutiner, G. Dissémination des Graines par les Poissons. Bull. Herb. Boiss. **7**: 459–466. 20 Je. 1899.

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Krause, E. H. L. Nova Synopsis Ruborum Germaniae et Virginiae. Pars I. 4to. 1–105. *pl. 1–12*. Saarlouis, 1899.

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Loesener, T. Plantae Selerianae; die von Dr. Eduard Seler und Frau Caecilie Seler in Mexico und Centralamerica gesammelten Pflanzen. Bull. Herb. Boiss. **7**: 534–553. 25 Jl. 1899; 561–579. 30 Au. 1899.

Includes descriptions of new species in *Habenaria*, *Microstylis*, *Stelis*, *Epidendrum*, *Bauhinia*, *Cassia*, *Hippocratea*, *Cuphea*, *Loeselia*, *Scutellaria*, *Pseuderanthemum*, and *Cardiacanthus* (?).

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5 O.; 97–116. 11 O.; 145–156. 18 O.; 193–204. 25 O.; 241–251. 1 N.; 1899. [Illust.]

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